INTRODUCTION

Sensitivity to market risk reflects the degree to which changes in interest rates, foreign exchange rates, commodity prices, or equity prices can adversely affect a financial institution's earnings or economic capital.[1]

In this section, we discuss interest rate risk (IRR) only, as IRR is the primary component of market risk that affects savings institutions.

Thrift Bulletin (TB) 13a, *Management of Interest Rate Risk, Investment Securities, and Derivatives Activities*, provides guidance to boards of directors and managers on IRR, investment securities, and derivatives activities. Because TB 13a discusses management of all of these activities, there is overlap between this Handbook Section on IRR, the Investment Securities Section, and the Off-Balance-Sheet Derivatives and Hedging Section.

We define IRR as the sensitivity of a depository institution's earnings and net portfolio value (NPV) to changes in interest rates. IRR results from the differences in the way interest rate changes affect the values of assets, liabilities, and off-balance-sheet instruments. IRR poses repricing risk, yield curve risk, basis risk, and options risk.

The interest rate sensitivity of an institution's portfolio depends on the characteristics of the financial instruments that make up the portfolio. Because deposit liabilities typically reprice faster than mortgage assets, rising interest rates adversely affect most thrift institutions. This means their NPV and earnings decline when interest rates rise and increase when interest rates fall. Due to their portfolio composition, there are some institutions, however, that experience both decreased earnings and net worth when interest rates fall.

The interest rate sensitivity of a financial instrument depends on many factors including the following:

- Maturity (generally, of two otherwise identical instruments, the one with the longer maturity will be more interest rate sensitive).
- Repricing characteristics (instruments such as adjustable-rate loans that reprice frequently to market interest rates are typically less interest rate sensitive than fixed-rate instruments).
- The presence of embedded options, such as loan prepayments, interest rate caps, and deposit withdrawal options that affect the timing of the cash flows generated by the instruments.

To evaluate properly the IRR exposure of a thrift institution, we must analyze the effect of interest rate changes on the entire portfolio. It can be misleading to conclude that an institution has high IRR exposure based on a few very rate sensitive instruments. In fact, the institution can offset the interest rate sensitivity of those instruments with other instruments in the portfolio that are less rate sensitive, or that are inversely affected by rate changes.

Both the board of directors and senior management of a thrift institution are responsible for the management of IRR. See 12 CFR § 563.176. We summarize below IRR management responsibilities. We describe these responsibilities more fully in Appendix B of TB 13a.

This Handbook Section includes the following topics:

- Sound practices for IRR management.
- OTS's minimum guidelines for IRR.
- OTS's guidelines for assessing sensitivity to market risk, primarily IRR (the S component rating).
- Examination objectives.

[1] 61 Fed. Reg. 67029 (1996).

Appendix A describes four types of IRR models used by thrifts, and Appendix B discusses reconciliation of the OTS NPV sensitivity estimates with the institutions' own estimates.

SOUND PRACTICES

The objective of IRR management is to control an institution's exposure to changes in interest rates. Management can then maintain adequate levels of earnings and capital over a range of possible interest rate environments. Section 563.176 establishes requirements for the management of IRR.

Management Strategy

The board and management are responsible for the institution's IRR management strategy and its implementation. They must understand the strategy and its possible effects on the short- and long-term financial health of the institution.

In formulating an IRR strategy, the board and management should take into account the level of expertise needed to implement the strategy. A prudent IRR management strategy should be within the scope of existing management expertise. The institution should not rely on speculative plans to remedy an excessive IRR exposure, nor should it incur excessive credit or liquidity risk to do so.

There can be circumstances in which the steps taken to manage IRR conflict with other business goals. To minimize such conflicts, management should develop an IRR strategy in conjunction with the creation of a comprehensive business plan for the institution.

It could be that the profitability, financial structure, and IRR targets that an institution would choose independently of one another are not attainable simultaneously. By developing these targets and the plans for achieving them as part of a single process, management can determine which combinations of targets are feasible and can make an informed choice among them.

Policy and Procedures

The board's policy statement should include established limits and controls on IRR exposure.

The board's policy statement should clearly define the delegation of responsibility for managing the institution's exposure to IRR. The policy statement should provide specific authorizations and restrictions regarding the institution's investment and trading activities, the use of derivatives and synthetic instruments, and hedging strategies.

It is senior management's responsibility to successfully implement the policy by establishing adequate guidelines and procedures. Further, senior management is responsible for reporting on the implementation and monitoring of such policy to the board on a periodic basis. The board shall review the results of operations at least quarterly (§ 563.176(e)) and make adjustments to the policy as needed.

Risk Measurement, Monitoring, and Control Functions

Institutions should:

- Have IRR measurement systems that capture all significant sources of IRR. Measurement systems should use accepted financial concepts and risk measurement techniques and should incorporate sound assumptions and parameter values. Management should understand the assumptions underlying their systems. Ideally, institutions should have IRR measurement systems that assess the effects of interest rate changes on both earnings and economic value.
- Establish and enforce risk limits that maintain exposures within prudent levels. A system of IRR limits should set prudent boundaries for the level of IRR for the institution. Management should ensure that it maintains the institution's IRR exposure within the board's self-imposed limits. Where appropriate, the institution should also set limits for individual portfolios, activities, or business units.
- Measure their risk exposure under a number of different scenarios and consider the results when establishing and reviewing their policies and limits for IRR.
- Have accurate, informative, and timely management information systems, both to inform

management and to support compliance with board policy.

Besides monitoring institutions, there should be internal controls over the IRR management process. Systems should include regular independent reviews by outside parties and evaluations of the effectiveness of the system itself, at least annually.

Analysis and Stress Testing of Investments and Financial Derivatives

Management should undertake a thorough analysis of the various risks associated with investment securities and derivative instruments before making an investment or taking a significant position in financial derivatives and periodically thereafter. The board of directors or a committee of the board should approve, in advance, major initiatives involving investments and derivative transactions.

Evaluation of New Products, Activities, and Financial Instruments

Involvement in new products, activities, and financial instruments (assets, liabilities, or off-balance-sheet contracts) can entail significant risk, sometimes from unexpected sources. Senior management should evaluate the risks inherent in new products, activities, and instruments to ensure that they are subject to adequate review procedures and controls.

MINIMUM GUIDELINES REGARDING INTEREST RATE RISK

Interest Rate Risk Limits

TB 13a requires that the board's policy statement contain limits on the following measures:

- Changes in NPV. All institutions should establish and demonstrate quarterly compliance with board-approved limits on IRR, in terms of NPV. These limits should specify the minimum NPV Ratio[2] the board is willing to allow under current interest rates and for a range of six hypothetical interest rate scenarios.
- Earnings sensitivity. Earnings-based limits can provide a useful supplement to the NPV-based limits. OTS does not require institutions to establish limits and conduct earnings sensitivity analysis. OTS does, however, consider it a good management practice for institutions to estimate the interest rate sensitivity of their earnings and to incorporate this analysis into their business plan and budgeting process.

IRR limits reflect the board of directors' risk tolerance, and should be prudently set. The board should periodically reevaluate the appropriateness of the institution's IRR limits, particularly after a significant change in market interest rates. Any changes should receive careful consideration and be documented in the minutes of the board meeting.

Systems for Measuring Interest Rate Risk

Key elements in managing market risk are identifying, measuring, and monitoring IRR. To ensure compliance with its board's IRR limits and to comply with OTS regulation §563.176, each institution must have a way to measure its IRR. OTS guidelines for IRR measurement systems are as follows, although you have broad discretion to require more rigorous systems.

Institutions Below $1 Billion In Assets

These institutions can usually rely on the quarterly NPV estimates produced by OTS and distributed in the *Interest Rate Risk Exposure Report*. The institution should be able to measure, or have access to measures of, the economic value of complex securities under the range of interest rate scenarios as described in TB 13a, Part II.A.1, *Limits on Change in Net Portfolio Value.* The institution can use OTS estimates for the other financial instruments in its portfolio, although you may direct otherwise, if necessary.

Institutions With More Than $1 Billion In Assets

[2] To calculate and express an institution's NPV Ratio for a given interest rate scenario, the institution should divide the net portfolio value that would result in that scenario by the present value of the institution's assets in that same scenario. The NPV ratio is analogous to the capital-to-assets ratio used to measure regulatory capital, but NPV is measured in terms of economic values (or present values) in a particular rate scenario.

These institutions should measure their own NPV and its interest rate sensitivity. TB 13a gives guidance on desirable methodological features in evaluating the quality of such institutions' NPV measurement systems.

You may determine that an institution should use more sophisticated measurement techniques for individual financial instruments or categories of instruments because of the following considerations:

- The volume and price sensitivity of a group of financial instruments.
- Concern that the institution's results may materially misstate the level of risk.
- The combination of a low post-shock NPV ratio and high sensitivity measure.

In any case, the institution should be familiar with the details of the assumptions, term structure of interest rates, and logic used in performing the measurements. Therefore, measures obtained from financial screens or vendors may not always be adequate.

In addition to the interest rate scenarios described above, OTS recommends that institutions evaluate the effects of other stressful market conditions.

As part of your assessment of the quality of an institution's risk management practices, you should consider the extent to which management integrates the institution's risk measurement process with its decisionmaking. Institutions may do this by using an earnings sensitivity approach, an NPV sensitivity approach, or any other reasonable approach. The institution has discretion over all aspects of such analysis, but it should not be merely *pro forma* in nature. If evidence of such integration is not apparent, you should consider written criticism in the report or an adverse rating.

OTS MEASUREMENT OF INTEREST RATE RISK

Schedule CMR of the Thrift Financial Report collects consolidated data on the interest rates and maturities of thrifts' assets, liabilities, and off-balance-sheet contracts. OTS requires all institutions with assets in excess of $300,000 million and with risk-based capital ratios below 12 percent to file Schedule CMR. All others may do so at their option.

OTS calculates quarterly estimates of NPV sensitivity for all institutions that file Schedule CMR and provides them with an Interest Rate Risk Exposure Report. This report lists OTS estimates of the institution's NPV in seven interest rate scenarios. The report provides ratios that you can use to assess an institution's IRR exposure and to compare it with other institutions.

Evaluating Interest Rate Risk Exposure

To make meaningful judgments about an institution's exposure to changes in interest rates, it is helpful to measure and compare its exposure with that of other institutions under a standardized framework. The framework adopted by OTS for this purpose is to examine exposure in the context of how an instantaneous, adverse shift in interest rates of plus or minus 200 basis points affects an institution's NPV.

OTS views the effect on NPV of an adverse rate shock relative to the size of the estimated present value of the institution's assets. An institution's NPV ratio is its NPV divided by the present value of its assets (PVA) both measured in the same interest rate scenario, or:

$$\text{NPV Ratio} = \frac{\text{NPV}}{\text{PVA}}$$

It is important to determine both the level to which an institution's NPV ratio declines as a result of an adverse change in interest rates, as well as the magnitude of the decline in the ratio.

Two measures help detect excessive exposure:

- The post-shock NPV ratio.
- The sensitivity measure.

Post-shock NPV Ratio

The post-shock NPV ratio is an institution's NPV ratio after an adverse interest rate shock of 200 basis points.

$$\text{Post - shock NPV Ratio} = \frac{\text{NPV after Shock}}{\text{PVA after Shock}}$$

$$= \frac{NPV_{+200} \text{ or } NPV_{-200}}{PVA_{+200} \text{ or } PVA_{-200}}, \text{ whichever is lower.}$$

Table 1 illustrates the calculation of the post-shock NPV ratio. This table shows the estimated change in the present value of the assets, liabilities, and NPV of XYZ Savings Association resulting from a 200 basis point increase and decrease in interest rates.

TABLE 1

	Interest Rate Scenario		
	-200 Basis Point Change	Base Case	+200 Basis Point Change
Present Value of Assets	$105	$100	$80
Present Value of Liabilities	-99	-95	-77
NPV	6	5	3
NPV Ratio	5.7%	5%	3.8%

In Table 1, the adverse scenario is the one in which rates increase 200 basis points. Under that scenario, XYZ's NPV ratio declines to 3.8 percent. Thus, XYZ's post-shock NPV ratio is 3.8 percent.

Again, the post-shock NPV ratio is simply the NPV ratio that results from the more adverse 200 basis point shift in rates. This ratio indicates the cushion of economic capital an association would retain should an adverse change in interest rates occur.

The post-shock NPV ratio is a function of the sensitivity of NPV to changes in rates and the size of the NPV cushion in the base case scenario. Thus, an institution's post-shock NPV ratio could be low for one of two reasons:

- Its portfolio is very sensitive to changes in interest rates, causing it to lose a large portion of its NPV in an adverse interest rate move.
- Its base case NPV is low.

Thus, a low post-shock NPV ratio does not necessarily indicate high IRR. It may only indicate that the institution's base case NPV ratio is low.

Sensitivity Measure

The sensitivity measure gauges the magnitude of loss that an institution would suffer from the adverse move in interest rates. More specifically, it is the decline in the NPV ratio that will result from a hypothetical 200 basis point change in interest rates. In the example above, XYZ's NPV ratio declines 120 basis points from the base case level of 5.0 percent to 3.8 percent as a result of a 200 basis point increase in rates. The decline in the NPV ratio is simply the difference, expressed in basis points, between an institution's base case NPV ratio and its post-shock NPV ratio.

Taken alone, a large decline in the NPV ratio does not necessarily indicate excessive risk. An institution with a strong capital position could experience a sharp decline in its NPV ratio, as a result of a 200 basis point rate shock, and still be left with a substantial capital cushion.

In summary, OTS views exposure analysis as a two-dimensional problem that involves estimating both the level to which an institution's NPV ratio will decline as a result of an adverse rate shock, as well as the extent of the decline.

Guidelines for the Sensitivity to Market Risk Component Rating

Consistent with the interagency CAMELS rating system, you must base the Sensitivity to Market Risk component rating (S Rating) on your conclusions about two dimensions:

- An institution's level of market risk.
- The quality of its practices for managing market risk.

Assessing the Level of IRR

Assess the level of IRR by using the post-shock NPV ratio and the interest rate sensitivity measure. You should base your conclusions about an institution's level of interest rate risk – the first dimension for determining the S component rating

– primarily on the interest rate sensitivity of the institution's net portfolio value.

OTS uses risk measures based on NPV for several reasons:

- The NPV measures are more readily comparable across institutions than internally generated measures of earnings sensitivity.
- NPV focuses on a longer-term analytical horizon than institutions' internally generated earnings sensitivity measures. The interest rate sensitivity of earnings is usually measured over a short-term horizon such as a year, while NPV is based on all future cash flows anticipated from an institution's existing assets, liabilities, and off-balance-sheet contracts.
- The NPV-based measures take better account of the embedded options present in the typical thrift institution's portfolio.

Guidelines for Determining the Level of IRR

In describing the five levels of the S component rating, the interagency uniform ratings system established several broad, descriptive levels of risk:

- Minimal
- Moderate
- Significant
- High
- Imminent threat.

Table 2 indicates IRR levels ordinarily assigned for OTS-regulated institutions, based on the combination of each institution's post-shock NPV ratio and interest rate sensitivity measure.

These risk levels are for guidance, they are not mandatory. You should use them as starting points in your ratings assessments, but you have broad discretion to exercise judgment. See the discussion under Examiner Judgment later in this section.

TABLE 2
SUMMARY OF GUIDELINES FOR THE LEVEL OF INTEREST RATE RISK

POST SHOCK NPV RATIO	INTEREST RATE SENSITIVITY MEASURE			
	0 - 100 B.P.	100-200 B.P.	200-400 B.P.	OVER 400 B.P.
OVER 10%	MINIMAL RISK (1)	MINIMAL RISK (1)	MINIMAL RISK (1)	MODERATE RISK (2)
6% TO 10%	MINIMAL RISK (1)	MINIMAL RISK (1)	MODERATE RISK (2)	SIGNIFICANT RISK (3)
4% TO 6%	MINIMAL RISK (1)	MODERATE RISK (2)	SIGNIFICANT RISK (3)	HIGH RISK (4)
BELOW 4%	MODERATE RISK (2)	SIGNIFICANT RISK (3)	HIGH RISK (4)	HIGH RISK (4)

OTS characterizes an institution with a post-shock NPV ratio below four percent and an interest rate sensitivity measure of:

- More than 200 basis points as having high risk. Such an institution will typically receive a 4 or 5 rating for the S component.[3]
- 100 to 200 basis points as having significant risk. Such an institution will typically receive a 3 rating for the S component.
- 0 to 100 basis points as having moderate risk. Such an institution will typically receive a rating of 2 for the S component. If the institution's sensitivity is extremely low, a rating of 1 may be supportable unless the institution is likely to incur larger losses under rate shocks other than the parallel shocks depicted in OTS's NPV Model.

[3] According to the interagency uniform CAMELS ratings system, the level of market risk at a 4-rated institution is high, while that at a 5-rated institution is so high as to pose an imminent threat to its viability. Under the Prompt Corrective Action regulation supervisory action is tied to regulatory capital. See12 CFR Part 565. An institution's viability is, therefore, directly dependent on regulatory capital, not on economic capital. Because regulatory capital can remain positive for an extended period of time after economic capital has become zero or negative, the NPV measures are not by themselves indicators of near-term viability. For an institution's level of interest rate risk to constitute an imminent threat to viability, the institution will typically have a high level of interest rate risk *and* will have other serious financial problems that place it in imminent danger of closure.

OTS characterizes an institution with a post-shock NPV ratio of between four percent and six percent and an interest rate sensitivity measure of:

- More than 400 basis points as having high risk. Such an institution will typically receive a 4 or 5 rating for the S component.
- 200 to 400 basis points as having significant risk. Such an institution will typically receive a 3 rating for the S component.
- 100 to 200 basis points as having moderate risk. Such an institution will typically receive a 2 rating for the S component.
- 0 to 100 basis points as having minimal risk. Such an institution will typically receive a rating of 1 for the S component.

OTS characterizes an institution with a post-shock NPV ratio of between six percent and ten percent and an interest rate sensitivity measure of:

- More than 400 basis points as having significant risk. Such an institution will typically receive a 3 rating for the S component.
- 200 to 400 basis as having moderate risk. Such an institution will typically receive a 2 rating for the S component.
- Less than 200 basis points as having minimal risk. Such an institution will typically receive a rating of 1 for the S component.

OTS characterizes an institution with a post-shock NPV ratio of more than ten percent and an interest rate sensitivity measure of:

- More than 400 basis points as having moderate risk. Such an institution will typically receive a 2 rating for the S component.
- Less than 400 basis points as having minimal risk. Such an institution will typically receive a rating of 1 for the S component.

In Table 2 the numbers in parentheses represent the S component ratings that you would typically use as starting points in your analysis, assuming there are no deficiencies in the institution's risk management practices.

You may assign a different rating based on interpretation of the facts and circumstances at each institution.

Internal vs. OTS Risk Measures

In applying the guidelines described above, you will encounter three general types of situations regarding the availability of risk measures.

- If the institution does not have internal NPV measures, but does file Schedule CMR, use the NPV measures produced by OTS. In such instances, you must be aware of the importance of accurate reporting by the institution on Schedule CMR. This is important particularly for items for which the institution provides its own market value estimates in the various interest rate scenarios, such as for mortgage derivative securities. You must also be aware of circumstances in which OTS measures may overstate or understate the sensitivity of an institution's financial instruments.
- If the institution does produce its own NPV measures, you will have to decide whether to use the institution's or OTS's risk measures.
  - — If the institution's own measures and those produced by OTS are broadly consistent and result in the same risk category (for example, minimal risk, moderate risk), the choice between using the institution's measures or OTS estimates probably does not matter. However, you should attempt to ascertain the reasons for any major discrepancies between the two sets of results.
  - — If the institution's NPV measures place it in a different risk category than OTS measures, you should determine which financial instruments are the source of that discrepancy and consult with the Regional Capital Markets group or the Washington Risk Management Division. If you judge that the institution's valuations for those instruments are more reliable than OTS's,

use the institution's results rather than OTS's for those financial instruments in calculating NPV in the various interest rate scenarios.

— If you have reason to doubt *both* the institution's own measures and those produced by OTS, you may modify either or both measures to arrive at reasonable NPV measures. You should do this only after consultation with the Regional Capital Markets group or the Washington Risk Management Division. In deciding whether to rely on an institution's internal NPV measures, you must ensure that the institution's measures are calculated in a way that is broadly consistent with OTS calculations. OTS describes the major methodological points to consider in TB 13a, Part II. B, *Systems for Measuring Interest Rate Risk*.

- The institution does not calculate internal NPV measures and does not report on Schedule CMR. Because no NPV results will be available in such cases, the guidelines are not directly applicable. In addition to reviewing the institution's balance sheet structure in such cases, you will review whatever IRR measurement and management tools the institution uses to comply with § 563.176. Depending on your findings regarding the institution's general level of risk and its risk management practices, you might reconsider the appropriateness of the institution's continued exemption from filing Schedule CMR.

Assessing the Quality of Risk Management

In drawing conclusions about the quality of an institution's risk management practices – the second dimension of the S component rating – you must assess all significant facets of the institution's risk management process. To aid in that assessment, refer to Appendix B of TB 13a, Sound Practices for Market Risk Management. These sound practices suggest the style of management practices institutions of varying levels of sophistication may use. Because there is no formula for determining the adequacy of such systems, you must make that determination on a case-by-case basis. You must consider the following eight factors, among others, in assessing the quality of an institution's risk management practices.

- Oversight by Board and Senior Management. Assess the quality of oversight provided by the institution's board and senior management. That assessment may have many facets, as described in TB 13a, Appendix B, Sound Practices for Market Risk Management.

- Prudence of Limits. Assess the prudence of the institution's board approved IRR limits. Ordinarily, a set of IRR limits should concern you if the limits permit the institution to have a post-shock NPV ratio and interest rate sensitivity measure that would ordinarily warrant an S component rating of 3 or worse. Depending on the level of concern, such limits may deserve criticism or an adverse S component rating.

- Adherence to Limits. Assess the degree to which the institution adheres to its IRR limits. Frequent exceptions to the board's limits may indicate weak IRR management practices. Similarly, recurrent changes to the institution's limits to accommodate exceptions to the limits may reflect ineffective board oversight.

- Quality of System for Measuring NPV Sensitivity. Consider whether the quality of the institution's risk measurement and monitoring system is commensurate with the institution's size, the complexity of its financial instruments, and its level of IRR.

- Quality of System for Measuring Earnings Sensitivity. OTS places considerable reliance on NPV analysis to assess an institution's IRR. You should consider other types of measures in evaluating an institution's risk management practices. In particular, you may view use of a well-supported earnings sensitivity analysis as a favorable factor in determining an institution's component rating. In fact, you should encourage all institutions to measure the interest rate sensitivity of projected earnings. Despite inherent limitations,[4] such analyses can provide useful information to an institution's management.

  Methodologies used in measuring earnings sensitivity vary considerably among different institutions. Institutions should have clear descriptions of the methodologies and assumptions used in their models. The type of rate scenario used is of particular importance. Examples are instantaneous shock or gradual movements, consistent with forward yield curve. Also important are assumptions regarding new business (that is, type of assets, dollar amounts, and interest rates). In addition, institutions should clearly describe formulas for projecting interest rate changes on existing business (for example, ARMs, transaction deposits). Institutions should also explain and support any major differences from analogous formulas used in OTS's NPV Model.

- Integration of Risk Management with Decision Making. Consider the extent to which management uses the results of an institution's risk measurement system in making operational decisions. Examples are changes in portfolio structure, investments, derivatives activities, business planning, funding decisions, and pricing decisions. This is of particular significance if the institution's post-shock NPV ratio is relatively low, and thus provides less of an economic buffer against loss.

  Evaluate whether management considers the effect of significant operational decisions on the institution's level of IRR. The form of analysis used for measuring that effect (earnings sensitivity, NPV sensitivity, or any other reasonable approach) and all details of the measurement are up to the institution. That analysis should be an active factor in management's decisionmaking and not be generated solely to avoid examiner criticism. In the absence of such a decision-making process, criticism in the report or an adverse rating may be appropriate.

- Investments and Derivatives. Consider the adequacy of the institution's risk management policies and procedures regarding investment and derivatives activities. See Part III of TB 13a, Investment Securities and Financial Derivatives, for a detailed discussion.

- Size, Complexity, and Risk Profile. Under the interagency uniform ratings descriptions, evaluate an institution's risk management practices relative to the institution's size, complexity, and risk profile. A small institution with a simple portfolio and a consistently low level of risk may receive an S rating of 1 even if its risk management practices are fairly rudimentary. A large institution with the same characteristics should have more rigorous risk management practices. However, OTS would not hold it to the same risk management standards as a similarly sized institution with either a higher level of risk or a portfolio containing complex securities or financial derivatives. An institution making a conscious business decision to maintain a low risk profile by investing in low risk products or maintaining a high level of capital may not require elaborate and costly risk management systems.

Combining Assessments of the Level of Risk and Risk Management Practices

Use the guidelines described in the two previous sections to assess an institution's level of risk and the quality of its risk management practices. This section provides guidelines for combining these two assessments into an S component rating for the institution.

[4] The effectiveness of an earnings sensitivity model to identify interest rate risk depends on the composition of an institution's portfolio. In particular, management should recognize that such models generally do not fully take account of longer term risk factors.

The interagency uniform ratings descriptions specify the criteria for the S component ratings in terms of the level of risk and the quality of risk management practices. For example:

> "A rating of 1 indicates that market risk sensitivity is *well controlled* and that there is *minimal* potential that the earnings performance or capital position will be adversely affected.…" [*emphasis added*]

Thus, if market risk is less than well-controlled (that is, adequately controlled, in need of improvement, or unacceptable), the institution does not qualify for a component rating of 1. Likewise, if the level of market risk is more than minimal (that is, moderate, significant, or high), the institution similarly does not qualify for a rating of 1.

Applying the same logic to the descriptions of the 2, 3, 4, and 5 levels of the S component rating results in the ratings guidelines shown in Table 3. That table summarizes how various combinations of assessments about an institution's level of IRR and quality of risk management practices translate into a suggested rating.[5]

Note two important caveats about this table. First, the two dimensions are not totally independent of one another, because we evaluate the quality of risk management practices relative to an institution's level of risk (among other things). Thus, for example, you are more likely to assess an institution's risk management practices as well-controlled if the institution has minimal risk than if it has a higher level of risk. Second, the ratings shown in Table 3 provide a starting point, but you have broad discretion to exercise judgment and deviate from them.

Examiner Judgment

Blind adherence to the guidelines is undesirable. You have a responsibility to exercise judgment in assigning ratings based on the facts you encounter at each institution. This section provides a nonexhaustive list of factors you might consider in applying the S rating guidelines to a particular institution.

Judgment in Assessing the Level of Risk

In assessing the level of IRR, the likelihood that you will deviate from the guidelines in Table 2 increases in cases where the post-shock NPV ratio and the interest rate sensitivity measure are both near cell boundaries. For example, there is no material difference between an institution whose post-shock ratio and sensitivity measure are, respectively, 4.01 percent and 199 basis points and one where they are 3.99 percent and 201 basis points. The guidelines in Table 2, however, suggest a 2 rating for the former and a 4 for the latter. Clearly, you must interpret the row and column boundaries of the cells in the table as transition zones or gray areas, rather than as precise cut-off points, between suggested ratings. As such, you will more commonly deviate from the stated guidelines in the vicinity of cell borders than in their interior. Open-ended cells are another instance where you will more commonly deviate from the guidelines. For example, in assessing an institution whose sensitivity measure is well beyond 400 basis points, you might very well determine that its level of risk is higher than the guidelines in the rightmost column of Table 2.

TABLE 3
S COMPONENT RATING GUIDELINES IN MATRIX FORM

Quality of Risk Management Practices*	Level of Interest Rate Risk			
	Minimal Risk	Moderate Risk	Significant Risk	High Risk**
Well Controlled	S=1	S=2	S=3	S=4 or 5
Adequately Controlled	S=2	S=2	S=3	S=4 or 5
Needs Improvement	S=3	S=3	S=3	S=4 or 5
Unacceptable	S=4	S=4	S=4	S=4 or 5

*Evaluate quality of risk management practices relative to an institution's size, complexity, and level of IRR.

**To receive a component rating of 5, an institution's level of IRR must be an imminent threat to its viability. Such an institution will typically have a high level of IRR *and* will have other serious financial problems that place it in imminent danger of closure.

[5] You will rarely, if ever, encounter some of the combinations of risk management quality and level of risk shown in the table (for example, an institution with unacceptable risk management practices, but a minimal level of risk). For the sake of completeness, however, OTS shows all cells of the matrix.

In applying the guidelines in Table 2, many considerations may cause you to reach a different conclusion than suggested by the guidelines. Such considerations include the following:

- The trend in the institution's risk measures during recent quarters.
- The trend in the institution's risk measures compared with those of the rest of the industry in recent quarters. (Comparison with the results for the industry as a whole often provides a useful backdrop for evaluating an institution's results, particularly during a period of volatile interest rates.)
- Your level of comfort with the overall accuracy of the available risk measures as applied to the particular products of the institution.
- The existence of items with particularly volatile or uncertain interest rate sensitivity for which you want to allow an added margin for possible error.
- The effect of any restructuring that may have occurred since the most recently available risk measures.
- Other available evidence that causes you to favor a higher or lower risk assessment than that suggested by the guidelines.

Judgment in Assessing the Quality of Risk Management Practices

Base conclusions about the quality of risk management practices, in part, on the institution's level of risk, with less risky institutions requiring less rigorous risk management practices. Considerations listed in the previous section, Judgment in Assessing the Level of Risk, may therefore cause you to modify your assessment of the institution's risk management practices. In addition, if changes have occurred in the institution's level of risk since the last evaluation, you may wish to reassess the quality of the institution's risk management practices considering these changes.

Supervisory Action

If you need to take supervisory action to address IRR, discuss the problem with management and obtain their commitment to correct the problem as quickly as practicable.

If deemed necessary, request a written plan from the board and management to reduce interest rate sensitivity, increase capital, or both. The plan should include specific risk measure targets. If the initial plan is inadequate, require amendment and resubmission. Document the corrective strategy and results and review progress at case review meetings.

For institutions with composite ratings of 4 or 5, the presumption of formal enforcement action generally requires a supervisory agreement, cease and desist order, prompt corrective action directive, or other formal supervisory action.

If an institution's IRR increases between examinations, consider whether the increase warrants a downgrade of the S component rating or the composite rating. Require quarterly progress reports, if necessary (more frequently if the situation is severe). Where appropriate, require the institution to develop the capacity to conduct its own modeling.

Validation of OTS's NPV Estimates

If the post-shock NPV ratio and the decline in the NPV ratio indicate that an association may have excessive IRR, you should take steps to ensure the accuracy of OTS's NPV estimates.

You should check the data reported on Schedule CMR for reporting errors that can invalidate the NPV estimates. If you detect errors, the institution should correct the Schedule and recalculate NPV estimates.

Methods to Reduce Interest Rate Risk

Institutions that project declines in earnings and net portfolio value when interest rates increase may lower exposure by increasing the duration of liabilities or decreasing the duration of assets. The institution can accomplish this through portfolio restructuring or hedging. Examples of measures such institutions might undertake include the following:

- Increase the proportion of short term and adjustable-rate loans in the portfolio.
- Replace short-term funding with longer-term deposits and borrowings.
- Retain core deposits, which are typically less interest rate sensitive than CDs.
- Use derivative instruments, such as futures, options, interest rate swaps, and caps, to lower exposure to IRR. Management should have a thorough understanding of these instruments before using them.

Although the majority of thrift institutions are exposed to rising interest rates, there are a number of institutions that are exposed to falling rates. These institutions could lower their exposure by restructuring their portfolios to lengthen the duration of their assets or decrease the duration of their liabilities.

OTS publishes *Selected Asset and Liability Pricing Tables* on a quarterly basis. The tables provide estimated economic values of selected assets and liabilities as calculated by OTS's Net Portfolio Value Model in each of the interest rate scenarios described in TB 13a. Use the data in the tables to estimate the effect on the association's NPV sensitivity of buying or selling a particular asset or liability.

Evaluating Prudence of Interest Rate Risk Limits

The basic principle to use in evaluating the prudence of an institution's risk limits is whether they permit NPV to drop to a level where the post-shock NPV ratio and sensitivity measure would suggest an S component rating of 3 or worse under the guidelines for the Level of Interest Rate Risk. Refer to Table 2.

Examples of Evaluating the Prudence of Interest Rate Risk Limits

The following examples illustrate how to evaluate an institution's IRR limits. In each example column [b] shows the IRR limits approved by the institution's board of directors. These specify a minimum NPV Ratio for each of the interest rate scenarios shown in column [a]. Column [c] shows the NPV Ratios currently estimated for the institution for each rate scenario.

Institution A has a detailed set of IRR limits for which the board of directors specifies a minimum NPV ratio for each of the seven rate shock scenarios described in Part II.A.1 of TB 13a.

To assess the prudence of Institution A's IRR limits, evaluate the risk measures permitted under those limits relative to the guidelines for the Level of Interest Rate Risk in Table 2. The post-shock NPV ratio permitted by the institution's board limits is 7.00 percent (from the +200 basis points scenario in column [b], Institution A). The sensitivity measure permitted by the limits is not known. It depends on the *actual* level of the base case NPV ratio, which will probably be higher than the *limit* for the base case scenario.

Institution A
Limits and Current NPV Ratios

[a]	[b]	[c]
Rate Shock (in basis points)	Board Limits (Minimum NPV Ratios)	Institution's Current NPV Ratios
+300	6.00%	10.00%
+200	7.00	11.50
+100	8.00	12.50
0	9.00	13.00
-100	10.00	13.25
-200	11.00	13.50
-300	12.00	13.75

Therefore, use the institution's *current* sensitivity measure (based on OTS's results or those of the institution) in performing their evaluation. Institution A's current sensitivity measure is 150 basis points (13.00% - 11.50%). This is the difference between the NPV ratios in the 0 basis points and +200 basis points scenarios in column [c].

Referring to Table 2, the post-shock NPV ratio allowed by the institution's limits falls into the 6% to 10% row, and its current sensitivity measure falls into the 100 to 200 basis points column. The rating suggested by Table 2 is, therefore, a 1, and

you can probably consider Institution A's risk limits prudent.[6]

Institution B has identical IRR limits as Institution A, but is considerably more interest rate sensitive than Institution A at the present time. Institution B's sensitivity measure is 450 basis points (13.00% - 8.50%).

Institution B
Limits and Current NPV Ratios

[a]	[b]	[c]
Rate Shock (in basis points)	Board Limits (Minimum NPV Ratios)	Institution's Current NPV Ratios
+300	6.00%	6.00%
+200	7.00	8.50
+100	8.00	11.00
0	9.00	13.00
-100	10.00	14.00
-200	11.00	14.50
-300	12.00	15.00

For purposes of applying the guidelines in Table 2 to the limits, the post-shock NPV ratio of 7.00 percent permitted by the institution's board limits falls into the 6% to 10% row. Its *current* sensitivity measure, however, falls into the Over 400 B.P. column of Table 2. The rating suggested by the guidelines is therefore a 3, and you can consider Institution B's risk limits not sufficiently prudent. Even though its limits are identical to those of Institution A, its much higher *current* sensitivity measure requires the support of a higher post-shock NPV ratio than the minimum permitted by the board limits.

Institution C has the same current NPV ratios as Institution B. Its board of directors established the institution's IRR limits as a single minimum NPV Ratio of six percent that applies to all seven rate shock scenarios. In assessing the prudence of those limits, therefore, the post-shock NPV ratio permitted by the limits is six percent. The *current* sensitivity measure, like that of Institution B, is 450 basis points.

[6] This example assumes there are no significant deficiencies in the institution's risk management practices.

Institution C
Limits and Current NPV Ratios

[a]	[b]	[c]
Rate Shock (in basis points)	Board Limits (Minimum NPV Ratios)	Institution's Current NPV Ratios
+300	6.00%	6.00%
+200	6.00	8.50
+100	6.00	11.00
0	6.00	13.00
-100	6.00	14.00
-200	6.00	14.50
-300	6.00	15.00

In applying the Table 2 guidelines to the limits, Institution C's post-shock NPV ratio is in either the 4% to 6% or the 6% to 10% row. Its sensitivity measure is in the Over 400 B.P. column of Table 2. The rating suggested by the table is, therefore, a 3 or a 4, and so you can consider Institution C's risk limits *not* sufficiently prudent.

Institution D
Limits and Current NPV Ratios

[a]	[b]	[c]
Rate Shock (in basis points)	Board Limits (Minimum NPV Ratios)	Institution's Current NPV Ratios
+300	3.50%	2.50%
+200	3.50	3.25
+100	3.50	3.75
0	3.50	4.00
-100	3.50	4.25
-200	3.50	4.50
-300	3.50	4.75

Institution D has quite a low base case level of economic capital, and its board limits recognize that fact by permitting low NPV ratios. Furthermore, the institution's level of IRR currently exceeds the board limits. The current NPV ratios in the +200 and +300 scenarios are below the board's 3.50 percent minimum. While you would very likely express concern about that aspect of the institution's risk management process, you might still view the limits themselves as prudent.

To determine whether the institution's limits *are* prudent, use the post-shock NPV ratio of 3.50 percent permitted by the limits and the institution's current sensitivity measure of 75 basis points (4.00% - 3.25%). In applying Table 2, the

post-shock NPV ratio permitted by the limits falls into the Below 4% row and the *current* sensitivity measure falls into the 0 to 100 basis points column. The rating suggested by Table 2 is therefore a 2, and if Institution D's sensitivity measure has been consistently low, you might view its risk limits prudent. Because of the critical importance of the sensitivity measure in this determination, you might well arrive at a different conclusion if you lack assurance that the institution can maintain that measure at its current, low level.

Thus, if the sensitivity measure has been volatile in the past or if you have concerns about the quality of the institution's risk management practices, you might well conclude that the risk limits are not sufficiently prudent.

REFERENCES

Code of Federal Regulations (12 CFR)

§ 563.176	Interest Rate Risk Management Procedures

Office of Thrift Supervision Bulletins

TB 13a	Interest Rate Risk, Investment Securities, and Derivatives Activities

Other References

The OTS Net Portfolio Value Model

Selected Asset and Liability Price Tables

Interest Rate Risk Exposure Report

Interest Rate Risk Management Program

Examination Objectives

To determine compliance with TB 13a.

To determine if the interest rate risk (IRR) exposure limits set by the institution are prudent and if the institution is operating within those limits.

To identify weaknesses in the IRR measurement systems, internal management reporting, or internal controls.

To determine if the level of IRR is excessive.

To evaluate plans for reducing excessive IRR.

To summarize findings and initiate corrective action as necessary.

Examination Procedures

Level I

Wkp. Ref.

1. Review scoping materials applicable to IRR, including the NPV sensitivity analysis in the most recent IRR Exposure Report. If other examiners performed the review of these scoping materials, obtain a written or oral summary of the review(s). Review any monitoring information. Obtain the modeling folder (if any) from previous analyses performed on the institution.

2. Obtain and review the institution's written policies, procedures, and strategic plans governing IRR, along with the institution's overall business plan.

   - Briefly describe the general philosophy of the IRR policy. Is it consistent with the business plan?

   - Ensure that the policy contains the authorizations described in TB 13a. Specifically, ensure that the policy:

     — Delegates responsibility for the management of IRR.

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— Contains the authorizations and restrictions governing the following items:

* Trading activities
* Use of derivative and synthetic instruments
* Hedging strategies.

— Specifies both the contents of management's report to the board on IRR and the frequency with which the board receives the report.

- Does the policy contain IRR exposure limits in terms of changes in NPV in the six alternate interest rate scenarios (+/- 100, 200, and 300 basis points)? What are those limits?

- Are the exposure limits prudent given the institution's capital level, NPV ratio, management ability, and the exposure norms exhibited by similar institutions and the rest of the industry? (If you do not consider these limits prudent, you should work with management and the region's IRR contact to determine appropriate limits. Present revised limits to the board and use them to evaluate the association's level of IRR.)

3. Determine if the institution's IRR exposure (as measured either by OTS or internally) is in compliance with the limits set by the board. (If the institution has assets in excess of $1 billion or holds high-risk mortgage-derivative products, it is responsible for generating its own estimates of NPV sensitivity.)

   - What action did the institution take when it discovered noncompliance with the exposure limits?

   - Has OTS previously recommended corrective action? If so, has management corrected the problems?

4. If the association uses its own model to generate NPV sensitivity estimates, it must make an effort to explain differences between those estimates and the estimates of OTS's model if the:

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- Differences between the two are substantial.
- OTS estimates exceed the exposure limits, but the internal estimates do not. See Appendix B for a discussion of reasons for differences between OTS estimates and internal estimates.

5. Does management report to the board of directors at the frequency specified in their IRR policy (at least quarterly) regarding the sensitivity of NPV to changes in interest rates? Do these reports contain all information required by the IRR policy?

6. Complete Level II procedures if:

   - IRR exposure is high.
   - More than two years have passed since a Level II exam.
   - Level I procedures raise some concern about IRR management.

Level II

7. Assess the soundness of the association's measurement of IRR relative to the size of the association and the complexity of its balance sheet.

   Note: If the association has at least $1 billion in assets or holds high-risk mortgage-derivative products, it must produce its own measure of NPV sensitivity. It may supplement these measures with other measures of IRR. (If TB 13a requires the institution to establish its own measurement system, and it has not done so, inform your IRR contact immediately and highlight this failing in your examination comment.)

   If the association has less than $1 billion in assets and does not hold high-risk mortgage-derivative products, it may rely solely on the measure of NPV sensitivity produced by OTS Washington for IRR measurement.

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- For measures of IRR generated by the association:

  — Does the method used include all appropriate assets, liabilities, and off-balance-sheet items? Is the information accurate?

  — Are there any material comments about the quality of the model used to estimate IRR (that is, comments about the methodology, data, or assumptions used)? Specifically:

    * Is the model adequate given the size of the association and the complexity of its balance sheet? See Requirements for TB 13a NPV Models in this Section of the Handbook.

    * Is management able to explain satisfactorily any major differences between its results and those of OTS's model? (If questions arise regarding the reasonableness of the assumptions or methodology used, contact your region's IRR contact to ensure proper review of the adequacy of the institution's measurement system.)

- For associations using only OTS's model results:

  — Validate OTS's NPV sensitivity estimates. Are there any material comments about the appropriateness of the assumptions made in OTS's model to the association? Does OTS's analysis appear to be a reasonable depiction of the institution's IRR?

8. In view of the now-validated estimates of IRR, do you view this risk excessive? See the Measurement of IRR discussion in this Section for guidance.

9. Review management's IRR strategy.

   - What are the goals of the strategy? Are they consistent with board policy?

   - Does management have sufficient expertise to implement its strategy?

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10. Review the system of limits and controls over operations, and internal reporting used by management to ensure compliance with the board's limitations on IRR exposure.

    - Does management place specific controls on capital market activities? Have there been violations of these controls?
    - Are internal IRR reporting systems sufficiently clear, comprehensive, and timely to permit effective management of IRR and to ensure compliance with board policies?
    - Does management demonstrate the reasonableness of assumptions used in IRR analysis?

11. Assess management's ability to control the institution's exposure to IRR.

    - Does management have the knowledge and expertise necessary to develop and implement effective asset and liability strategies?

12. Has IRR increased since the last examination? What were the primary sources of the increase? Was this activity consistent with board policy and management's stated strategy on IRR?

    - Based on a review of pro-forma financial statements, assess whether the institution plans any major changes in activities and, if so, what is the effect on the institution's risk profile?

13. Review Schedule CMR to determine that the institution reports assets, liabilities, and off-balance-sheet instruments properly. Conduct an analysis of all instruments for which OTS's NPV estimates may be deficient or for which you believe the institution has more accurate estimates, and make adjustments where necessary.

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14. Conduct the Level III procedure if:

    - You are considering supervisory action for excessive IRR.
    - The institution is appealing your supervisory action.

15. Ensure that your review meets the Objectives of this Handbook Section. State your findings and conclusions, as well as appropriate recommendations for any necessary corrective measures, on the appropriate work papers and report pages.

Level III

16. Where you deem the level of IRR is excessive, present findings to management or the board of directors, along with any criticisms of management's ability to measure or manage IRR. Instruct management to provide OTS with a board-authorized plan to reduce the level of IRR to an acceptable level and to remedy deficiencies in IRR measurement or management.

Examiner's Summary, Recommendations, and Comments

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MODELS OF INTEREST RATE RISK

Analysis of Net Interest Income Sensitivity

Measures of interest rate risk (IRR) require reliable information on the amount and timing of the cash flows generated by an institution's assets, liabilities, and off-balance-sheet instruments. Because we do not always know this information with certainty, we make assumptions to perform the analysis. Depending on the type of analysis, these assumptions may include how:

- Market interest rates will change (over the period of analysis).
- Mortgage prepayment rates, deposit decay rates, and mortgage commitment "fallout rates" vary with interest rate changes.
- Management will administer interest rates that are under its control (such as loan rates and rates on retail deposits), when the general level of interest rates changes.
- Management will reinvest interest and principal cash flows.

Institutions commonly use two types of models to estimate the interest rate sensitivity of net interest income (NII): maturity gap models and NII simulation models. Likewise, there are two types of models commonly used to estimate the sensitivity of net portfolio value (NPV):

- Duration gap models.
- NPV simulation models.

Maturity gap and simple duration gap models are similar in that they implicitly make assumptions about the way interest rates and cash flows behave. Perhaps the most serious shortcoming of these models is that they assume that cash flows do not change in response to interest rate changes. For example, the model assumes that adjustable-rate loans do not reprice again after their next reset and that mortgage prepayment rates and deposit decay rates do not vary. The result is that the estimated change in NII or the change in the NPV of the institution is the same for a given increase in rates as it is for an equivalent decrease. However, in reality, the prepayment option embedded in mortgage assets results in asymmetric price changes for mortgages. That is, price increases when rates fall tend to be less than price declines when rates rise. The value of most thrift portfolios shows a similar sensitivity. We cannot accurately estimate this sensitivity by gap or duration models that assume that cash flows are the same in all interest rate environments.

NII and NPV simulation models, on the other hand, permit these assumptions to vary, but necessarily rely more heavily on the analyst to make choices about certain behavioral relationships incorporated into the model. Even though these models rely more heavily on parameters set by analysts, NII and NPV simulation models can be much more accurate than their less sophisticated counterparts, if we use appropriate assumptions. When assessing any measure of the IRR of an association, you should carefully evaluate the reasonableness of the assumptions used in the analysis.

Maturity Gap Models

Maturity gap is relatively easy to calculate, compared with other measures of IRR. During the 1980s, "gap" was the most commonly used measure of IRR in the thrift industry.

Maturity gap analysis measures the difference between the dollar value of assets and liabilities maturing or repricing during a given time period. We often express the dollar gap as a percentage of assets. When multiplied by a hypothetical change in interest rates, the dollar maturity gap gives a rough estimate of the effect of such a rate change on net interest income.

To calculate the maturity gap, principal balances of interest-earning assets and interest-bearing liabilities are categorized by maturity/repricing intervals or "buckets" (for example, under one year, one-to-three years), depending on when the institution receives the principal cash flows or when they adjust the interest rate. In more sophisticated gap models, the institutions adjust timing of the principal cash flows by incorporating the effects of loan amortization, mortgage prepay-

ments, core deposit decay, and the effects of off-balance-sheet hedging instruments.

As an example of a maturity gap calculation, assume that an association with $10 million in assets estimates that $3 million of those assets will "reprice" during the next year (by having principal mature, prepay, amortize, or having the coupon adjust). Further, the model estimates that $6 million of liabilities will reprice during this time. This institution has a "one-year gap" equal to negative 30% [($3m - $6m) / $10m].

$$GAP = \frac{(\$Assets\ Repricing) - (\$Liabilities\ Repricing)}{\$Total\ Assets}$$

To estimate the effect a change in interest rates has on an institution's interest margin, multiply the hypothetical rate change by the gap as a percent of assets. For example, the estimated effect of a one percent rise in interest rates on net interest income over the next year would be approximately 0.30 percent or 30 basis points (1.0% x -30% = -0.30%). Given assets of $10 million, this decrease in interest margin would translate to a reduction in NII of $30,000 over this period.

Although maturity gaps are relatively easy to measure and provide a rough measure of NII sensitivity, they have a number of well known shortcomings, including the following:

- Maturity gap models typically focus exclusively on near term NII. This focus hides the risk to NII of longer term repricing mismatches.
- The repricing intervals chosen for analysis are arbitrary, and there may be significant mismatches within a repricing interval that will be ignored in the analysis. The most common repricing intervals analyzed by thrift institutions are the one-year gap and the one- to three-year gap. A cash flow to be received in one year should have a different effect on interest rate exposure of an institution than an identical cash flow received in two and one-half years. Yet the one- to three-year gap model would treat these two cash flows as equivalent in terms of their effect on the IRR of the institution.
- Using maturity gaps to estimate the change in NII resulting from a change in interest rates assumes all interest rates change by the same amount – an unlikely occurrence. When the general level of interest rates increases by one percent, for example, some interest rates, such as those paid on passbook savings accounts, typically increase by a smaller amount, if at all.
- It is not possible to properly incorporate the effect of exchange-traded options or the options embedded in many financial instruments, such as early withdrawal options on CDs, the caps and floors in ARMs, and mortgage prepayment options. These options have a significant effect however, on the rate sensitivity of a financial instrument; neglecting to incorporate them into the analysis will misstate the IRR of an institution.

NII Simulation Models

NII simulation models project interest related cash flows of all assets, liabilities, and off-balance-sheet instruments in an institution's portfolio to estimate future net interest earnings over some chosen period of time. Analysts often refer to these models as "dynamic" NII simulation models. This is because you can build into the model changes in operating strategies, relative interest rates, early withdrawal of deposits, and prepayments.

Analysts calculate NII sensitivity as follows:

- Project base case NII for the current interest rate environment.
- Project cash flows for each instrument using assumptions about amortization characteristics, prepayment rates on mortgages, and deposit decay rates.
- Make assumptions about how to reinvest the principal and interest cash flows received during the period.

Next, run various simulations under alternative interest rate scenarios. For example, many models estimate the value of NII over the next year, if interest rates were to increase or decrease by one,

two or three percent. As in the base case scenario, interest cash flows are projected over the period of analysis, and will depend on assumptions about deposit decay rates, prepayment rates, and on how we assume rates on adjustable-rate loans and deposits change in each interest rate scenario. To project how the coupons on adjustable-rate assets will change, analysts need information on the time to first reset, reset frequency, and the presence of any rate caps or floors.

The larger the differences in projected earnings between the base case and the alternative interest rate scenarios, the higher the level of IRR.

NII Simulation offers the following advantages:

- NII simulation models can provide more accurate estimates of the effect of changing interest rates on the future interest income of instruments with embedded options by varying prepayment rates according to the interest rate scenario being simulated. We similarly assess the value of other embedded options (for example, lifetime caps on ARMs) and off-balance-sheet instruments in institutions' portfolios.
- We can assume interest rates on different instruments change by different amounts when there is a change in the general level of interest rates. For example, we can assume changes in rates on core deposits lag behind changes in other rates.

Simulation analysis also has this disadvantage:

- NII models that project NII over long periods should take the time value of money into account. Like gap analysis, NII simulation models typically measure the effect of a change in interest rates over only short periods of time such as one year. Models that do project NII over longer periods of time sometimes aggregate these future cash flows in a manner that implies that cash flows received in the distant future are as valuable as those received in the near future. For example, a model may indicate that if rates increase by one percent an institution will lose $100 during the next year but will gain $100 in year two of the analysis. In fact, the present value of the $100 received in two years is less than the value of $100 received in year one.

Analysis of the Sensitivity of Net Portfolio Value

The net portfolio value N, equals the estimated present value (or economic value) of assets, A, less the present value of liabilities, L, plus or minus the present value of all off-balance-sheet items, O.

Net Portfolio Value
$N = A - L + O$

Analysts commonly use two types of models to analyze the sensitivity of net portfolio value, the duration gap model, and the NPV sensitivity model. Both models require detailed information on the amount and timing of all future cash flows deriving from all financial instruments in the portfolio as well as the specification of appropriate discount rates.

Duration Gap Analysis

Duration gap is the difference between the weighted-average duration of assets and liabilities, adjusted for the net duration of all off-balance-sheet instruments. It is a measure of the percentage change in the NPV expected if interest rates were to change by one percent. This measure is a point estimate, and is accurate for only small changes in interest rates.

To calculate the duration gap, analysts separately calculate the duration of each item in the portfolio. Analysts weight the duration, D, of each instrument by the ratio of its market value to the net value of the portfolio, and net the weighted durations of all assets, liabilities, and off-balance-sheet instruments as follows:

Duration Gap
$D_N = D_A(A/N) - D_L(L/N) + D_O(O/N)$.

There are several different forms of the duration measure including simple (or Macaulay) duration and modified duration. Modified duration is the measure most often used to calculate the duration

gap, and because it requires calculation of simple duration, we describe both measures below.

Simple Duration

Simple duration was developed to provide a measure of the average time to receipt of the cash flows of a financial instrument. It measures the weighted-average time until payments are received, where the weights are the proportion of the total present value of the instrument received in each period.

Calculation of the simple duration of an instrument requires three steps. First, calculate the present value of each cash flow (principal and interest) by discounting them by the instrument's required yield. (The sum of these present values equals the estimated price or market value of the instrument.) Second, multiply each present value by the number of years until it occurs, and sum these time-weighted present values. Third, divide the sum of the time-weighted present values from step two by the sum of the unweighted present values from step one.

Modified Duration

Modified duration is a measure of the interest rate sensitivity of an instrument, and obtained by multiplying simple duration by -1/(1+r). Modified duration indicates the expected percentage change in an instrument's price for a given change in the required yield of the instrument.

$$\% \Delta P = (-D/1+r) \times \Delta r$$

where D = duration of the instrument
P = price of the instrument
r = required yield of the instrument
Δ represents "the change in."

For example, if a liability had a modified duration of 4, we could expect the price of the liability to decline by .04 percent (.0004) for each basis point increase in interest rates. After calculating the duration of each item in the portfolio each instrument's duration is weighted by the ratio of the market value of that instrument to the NPV, and netted.

Drawbacks of duration gap analysis include the following:

- Duration gap can be difficult to calculate. The problem lies in obtaining economic values for each instrument. If the analyst cannot obtain market price quotes, they may calculate the economic values using present value analysis, described in the next section on the NPV sensitivity model. Sometimes analysts use book values to calculate the duration gap when they cannot get or easily estimate market values. When economic values diverge significantly from book values, the use of book values may result in significant error in the estimation of the interest rate sensitivity of portfolio value.

- Duration gap analysis provides accurate estimates of price sensitivities of instruments only for small changes in interest rates, say, less than 100 basis points. Modified duration assumes the percentage price change due to a rate change of a given magnitude will be the same when rates rise or fall (although opposite in sign). This is not true, however, when rates change by a large amount.

  For a simple bond with no embedded options (such as a noncallable Treasury security), a large decrease in rates will result in a larger percentage increase in price than the percentage decrease in price that would result from an equal increase in rates. We call this phenomenon convexity. The analysis is further complicated when analyzing financial instruments with embedded options such as mortgage loans. Because borrowers tend to prepay their loans when refinancing rates fall below the coupon on the loans, the value of the loan will not rise as much as it would have had borrowers not prepaid (negative convexity).

- Duration does not take the shape of the yield curve into account. Analysts usually calculate the present values in the modified duration computation using the same discount rate (the required yield) for each future cash flow irrespective of when that cash flow will occur. This causes the model to overvalue long maturity cash flows and undervalue short

maturity cash flows, biasing the estimated duration.

NPV Sensitivity Analysis

The measure of IRR deemed most important by OTS is the sensitivity of the NPV to changes in interest rates. We define an institution's NPV as the present value of assets minus the present value of liabilities plus the net market value of off-balance-sheet contracts. The sensitivity of NPV is the change in an association's NPV that would result from a shift, or shock, in the term structure of interest rates, say, by plus or minus 100 basis points.

Unlike simple duration gap, we use this measure to estimate the change in economic value for substantial changes in interest rates, like 100 or 200 basis points or more. These larger changes in interest rates allow the measure of IRR to depict the thrift's economic exposure across a wider range of possible outcomes.

We devote the remainder of this section to a brief overview of NPV sensitivity analysis. In particular, we discuss two methods of measuring the economic value of financial instruments. For more details on this type of analysis, see *The OTS Net Portfolio Value Model* manual.

Items Included in the NPV Measure

NPV should include the estimated present value (or economic value) of all existing assets, liabilities, and off-balance-sheet items in an institution's portfolio. For example, it does not include the value of new loans the management estimates it would make under the various interest rate environments, or the value of new deposit accounts they believe they would attract. It does include, however, the value of all existing off-balance-sheet instruments.[1]

For their internal use, institutions can produce estimates of the interest rate sensitivity of their portfolios on a going concern basis, taking into account future business. For TB 13a purposes, however, NPV should include only the value of existing instruments.

Measuring NPV: Static Discounted Cash Flow Approach

We estimate the value of a financial instrument by projecting the amount and timing of the future net cash flows generated by the instrument, and discounting those cash flows by appropriate discount rates. We commonly refer to this procedure as discounted cash flow analysis, or present value analysis. The basic formula for the present value of a financial instrument is as follows:

$$PV = CF_1/(1+i_1) + CF_2/(1+i_2)^2 + \quad + CF_m/(1+i_m)^m$$

where CF_1 is the estimated amount of the first cash flow generated and i_1 is its discount rate. The discount rate used for each projected cash flow is the yield currently available to investors from cash flows resulting from alternative instruments of comparable risk and duration.

The accuracy of any valuation derived from the discounted cash flow analysis depends on the accuracy of both the cash flow estimates and the discount rates used. We must estimate these cash flows and discount rates not only for the current scenario, but for each of the alternate interest rate scenarios being estimated.

1. Estimating Cash Flows

The institution must estimate cash flows of all instruments separately for each interest rate scenario. The cash flows of many financial instruments held by institutions change depending on the course of interest rates. It is not acceptable for institutions to estimate the cash flows of these instruments for the base case and assume the instruments will realize those same cash flows in the alternate interest rate environments. NPV models should take account of the fact that coupons on adjustable-rate loans and deposits, mortgage prepayment rates, and core deposit decay rates will change depending on the interest rate scenario. Institutions should document the mortgage prepayment rates and deposit decay rates assumed in each interest rate scenario.

[1] Most off-balance-sheet instruments will be included on the balance sheet in the future with the adoption of FASB 133.

To the extent possible given their data systems, institutions should use disaggregated data to estimate the market value of the instruments in their portfolio. If sufficient information were available, institutions could value each loan, deposit, etc., separately by using information on amortization, coupon, maturity, and any options embedded in the instrument to estimate future cash flows. While it is usually not practical or necessary for institutions to disaggregate to the level of individual loans and deposit accounts, institutions should disaggregate instruments to the extent practical, grouping similar instruments together. OTS's NPV model and Schedule CMR guides the institution as to the minimum acceptable level of disaggregation.

Examples:

- Stratify fixed-rate mortgages into several coupon ranges (for example, seven to eight percent, eight to nine percent, etc.).
- Segregate adjustable-rate mortgages by index type, adjustment frequency, and distance to the lifetime cap. For example, value loans very close to their lifetime cap separately from loans with rates two percent from their cap.
- Segregate deposits by type, such as fixed-maturity deposits, MMDAs, transaction accounts, and passbook accounts. This stratification permits the application of appropriate parameters (prepayment rates, decay rates, etc.) to each type of instrument and will result in more accurate economic value estimates.

Under each interest rate scenario, we assume a single path of future interest rates based on future rates implied by the current term structure of interest rates. (In fact, analysts refer to this analysis as "static" cash flow analysis, because each scenario depicts a single hypothetical path of interest rates, as opposed to the numerous paths used in the option-adjusted spread [OAS] analysis described below.) The model calculates cash flows within each scenario based upon the assumed path of interest rates depicted in that scenario.

Cash flows may differ across scenarios for two reasons. First, loan prepayment and deposit attrition rates will differ, since borrowers and depositors will make different decisions about these actions under different interest rate environments. We model such differences in customer behavior by specifying a relationship between the interest rate scenario and the rates of prepayment and attrition, thereby changing the magnitude and timing of principal and interest cash flows. Second, the magnitude of interest cash flows differs across scenarios as adjustable-rate instruments (such as ARMs or MMDAs) reprice in future periods and receive different future coupon rates under different scenarios.

2. Discount Rates

The rate used to discount a cash flow should represent the yield obtainable in the market for a cash flow of similar maturity and risk.

There are two common methods for arriving at the discount rates for a particular instrument. The simpler method is to discount every projected cash flow by the yield of comparable instruments. In this case, each "i" in the previous equation would equal the current market yield of the instrument whose cash flows are being discounted.

A more complex, and more accurate method is to use non-constant discount rates based on the yields of zero-coupon instruments with maturities equal to those of each respective cash flow. In practice, analysts calculate for each cash flow a discount rate that has two components, a risk-free component, represented by the zero-coupon Treasury yield for the same maturity, and a fixed spread, which compensates investors for prepayment, credit, and liquidity risk. Analysts calculate the fixed spread as that increment to each of the risk-free components that causes the sum of the discounted cash flows to equal the observed market price of the instrument.

For either of the methods used, analysts typically adjust the discount rates in the alternate interest rate scenarios by adding or subtracting the amount of the interest rate shock (for example, for a plus 100 basis point scenario, add 100 basis points to each discount rate).

Measuring NPV: Option-Based Pricing

An option-based pricing approach is a more sophisticated approach to valuing assets (and, less frequently, liabilities) that contain embedded options. OTS uses this approach in the Net Portfolio Value Model to value mortgages and related assets.

The most important options in thrifts' portfolios are the prepayment options in mortgages and mortgage-related securities and the caps and floors in adjustable-rate mortgages. When mortgage rates fall, mortgage prepayments typically accelerate, forcing associations to reinvest the proceeds at lower yields. Interest rate caps and floors prevent the coupon rates of adjustable-rate loans from moving above or below a certain level when interest rates change. Both of these types of options can have a significant effect on the interest rate sensitivity of the instruments in which they are embedded.

In large part, the values of these options depend on the volatility of interest rates. When mortgage rate volatility increases, homeowners are more likely to prepay their mortgages. Higher volatility means there is a greater chance that mortgage rates will fall sufficiently below the rates on existing mortgages so as to induce prepayment. Likewise, the greater the volatility of the index on which adjustable-rate loans is based, the more likely that any rate cap or floor will constrain the coupon.

Option-based pricing models use an interest rate simulation program to generate numerous (hundreds or thousands) random interest rate paths that, in conjunction with a prepayment model, are used to estimate mortgage cash flows along each path. The model then discounts these cash flows and averages to arrive at a single mortgage price.

OAS models provide more accurate estimates of the value of these embedded options (and, therefore, of the mortgages themselves) than static discounted cash flow models. In a static cash flow analysis, the option has no value unless it is in the money (that is, the holder will exercise the prepayment option because rates have fallen and the homeowner chooses to refinance, or the rate cap or floor is effective). In fact, like exchange-traded options, these options have value even when they are not in the money, because it is possible they will be in the money at some future date. Market participants will, therefore, pay more or less for the instrument containing the option depending on the likelihood of exercise.

The sensitivity of NPV is a valuable measure of IRR, because it estimates how the economic value of an institution changes when interest rates change. In addition, the results are easy to interpret. It is, however, a complex measure that requires extensive modeling, and, as with any measure of IRR, the results are sensitive to the assumptions used.

OTS developed a computer model, called the Net Portfolio Value Model, that produces estimates of NPV sensitivity for each institution on a quarterly basis, as part of their Interest Rate Risk Exposure Report. Institutions with less than $1 billion in assets may use these estimates to comply with TB 13a. In addition, OTS uses these estimates to assess an association's IRR and to determine their compliance with TB 13a. For more detail on OTS's Net Portfolio Value Model or NPV sensitivity analysis in general, see *The OTS Net Portfolio Value Model* manual, or call the IRR contact person in your region.

RECONCILIATION OF THE OTS NPV SENSITIVITY ESTIMATES AND THRIFTS' TB 13a ESTIMATES WITH INSTITUTION'S OWN ESTIMATES

TB 13a requires that institutions with more than $1 billion in assets and smaller institutions that invest in high-risk mortgage-derivative products produce quarterly estimates of the interest rate sensitivity of their NPV. Institutions should be able to explain differences between the OTS estimates of NPV sensitivity and their own estimates if:

- There are substantial differences between the two sets of estimates.
- OTS's estimates exceed the institution's internal exposure limits, even though the institution's own estimates do not.

Some institutions that have attempted to reconcile their own estimates and the OTS estimates found that the differences are often the result of inconsistencies in input data for the two models. Institutions often have separate systems for gathering data for TFR reporting and for input into their own NPV models. The input data formats and levels of aggregation required for a given institution's model are likely to differ from those required by Schedule CMR. Institutions should, at a minimum, ensure consistency between the two models regarding the input data for totals of broad categories of assets and liabilities (for example, total current-index ARMs or total transaction accounts).

In addition to inconsistencies in input data, differences in methodologies for valuing financial instruments can cause significant differences between an institution's estimates and those of OTS. Two areas where differing methodologies can have a large effect are in the valuation of mortgages and core deposits. The manner in which the valuation methodology treats the mortgage prepayment option, and especially the interest rate caps in ARMs, can have a significant effect on the estimated price sensitivity of mortgages and the resulting NPV sensitivity estimates.

On the liability side, core deposit values can vary significantly depending on how fast the rate paid on deposits changes with changes in market rates and how fast existing balances shrink (decay) over time. Models that assume different decay rates (from those used by the OTS Model) result in different economic value estimates for core deposits. Some have argued that their core deposits do not decay; that new accounts replace those that are closed. The OTS estimate of NPV includes only *existing* assets, liabilities, and off-balance-sheet instruments. The assumption that any maturing asset or liability is replaced may result in NPV sensitivity estimates significantly different from the OTS estimates. Further, the OTS estimates include only those assets, liabilities, and off-balance-sheet activities that result in identifiable cash flows and, therefore, do not include the value of goodwill.

To help institutions determine the source of differences between OTS's NPV sensitivity estimates and their own, OTS publishes quarterly the *Selected Asset and Liability Price Tables*. These tables list the estimated economic values of various financial instruments calculated by the OTS model in each of seven interest rate environments described in TB 13a. For example, an institution could use the tables to compare the value estimated by the OTS model for a fixed-rate mortgage loan with a remaining maturity of 300 months and a coupon of 8 percent, in each of the interest rate environments, with the value calculated by its own model. (Consult *The OTS Net Portfolio Value Model* manual for a detailed description of the valuation of individual classes of assets and liabilities and a full description of what OTS includes in the NPV measure.)

You may determine that the methodologies and assumptions, for example, on mortgage prepayment rates and deposit decay rates, used by an institution's model are more appropriate for that particular institution than those used by OTS's model. You may accept the association's estimates as the more accurate estimate of the institution's NPV sensitivity. If you determine that the institution uses inappropriate methodologies or assumptions, you may rely solely on OTS estimates.

INTRODUCTION

The market for derivatives has grown rapidly during the past decade. For the most part, this rapid growth reflects the broad range of applications for these derivative products and their wide acceptance by financial institutions, institutional investors, and corporate treasurers. Savings associations typically use derivatives for hedging purposes. In this Handbook Section, we discuss specific objectives and considerations associated with hedging activity. Also in this Section, we describe the characteristics and risks of derivatives, and several regulatory considerations surrounding their use in hedging interest rate risk.

DERIVATIVE INSTRUMENTS

Financial derivatives are contracts that derive their value from that of an underlying asset, index, or reference rate. The most commonly used financial derivatives are swaps, futures, forwards, and options.

Some also use the term derivative security to describe securities with option-like characteristics and securities created by tranching, or stripping, other financial instruments. Derivative securities include structured notes and collateralized mortgage obligations (CMOs). A discussion of CMOs appears in Handbook Section 540, Investment Securities, Appendix C; and Handbook Section 560, Deposits and Borrowed Funds.

There are two distinct groups of derivative instruments: forward-based products and option-based products. Forward-based products include futures, forward contracts, and swaps. Option-based products include puts, calls, caps, floors, and collars. Some derivatives, such as options on futures, optional-purchase mortgage commitments, swaptions, and forward caps, combine the features of both forward and option contracts. Some derivatives trade on organized exchanges, while others trade on over-the-counter (OTC) markets.

Standardized contracts traded on the futures and options exchanges are exchange-traded derivatives. Each exchange operates a corporation, known as a clearinghouse, where it reconciles, guarantees, and settles all contracts. The clearinghouse places itself between the buyer and seller of each contract, and serves as the counterparty to each contract.

OTC contracts, on the other hand, are agreements entered into through private negotiations. Parties seek each other out to negotiate a trade. Many large securities firms and commercial banks, known as derivatives dealers, deal or make markets in derivatives. Swaps, forward agreements, options, caps, and floors actively trade in the OTC market. We discuss the different types of derivative instruments later in this Handbook Section.

Risks of Using Derivatives

Derivative instruments provide benefits but, as with other types of financial products, their use entails certain risks. The specific risks of a particular derivative transaction depend on the terms of the transaction and the financial condition and circumstances of the parties involved in the transaction. The primary risks include market risk, credit risk, legal risk, and operational risk.

Market Risk

Market risk involves the potential loss in value of a derivative due to changes in market conditions. These changes can include movements in interest rates (interest rate risk), changes in supply and demand factors (liquidity risk), and changes in other factors that can affect price. Sources of market risk differ for various types of derivatives. Savings associations should understand the forces that cause the market prices of derivatives to change.

Higher asset values or lower funding costs offset market losses on derivatives that savings associations use as hedges. In practice, however,

offsetting gains may not occur due to nonparallel movements in the yield curve, mortgage prepayments, deposit attrition, timing differences, or lack of liquidity. We discuss various types of market risk below.

Correlation Risk

The balance sheet item and the corresponding derivative may have different interest rate indices. There may not be perfect correlation between the movements of the interest indices or their correlation may change over time. For example, if a savings association uses a LIBOR-based swap to hedge short-term certificates of deposit (CDs),

the effectiveness of the hedge will depend on the extent the CD rate moves with LIBOR. If other factors, such as local market conditions, play a major role in setting rates, the hedge may be ineffective or, conversely, lower funding costs may not offset losses on the derivative. A similar correlation problem emerges when the balance sheet item and the corresponding derivatives use indices of different maturities. In that case, an inversion, or other nonparallel shift, in the yield curve could make the hedge ineffective.

Prepayment Risk

Because mortgages contain prepayment options, we do not know their actual effective maturity in advance. Moreover, prepayment rates tend to change as interest rates change. A derivative may be an effective hedge for small changes in interest rates but become invalid if interest rates move sharply up or down. Gains on a mortgage portfolio may, therefore, not fully offset losses on derivatives, and vice versa.

Deposit Attrition

Determining the effective term and rate sensitivity of non-maturity deposits, such as MMDAs and passbook accounts, is difficult because these deposits do not have explicit maturities. Withdrawal rates and the extent their interest rates track market rates vary over time and across institutions. As a result, hedging these liabilities is imprecise and requires a thorough analysis of depositor behavior.

Timing Differences

Another source of risk arises from timing differences between the hedging instrument and the hedged item. Consider the case of using swaps to hedge retail CDs. Swaps reprice on a specific date (for example, the end of a quarter) but CDs mature or reprice throughout a quarter. If interest rates change considerably within a quarter, the swap could be an ineffective hedge. A savings association can diversify this timing risk by entering into a number of separate swaps with different reset dates.

Inaccurate Initial Pricing

Certain complex derivative instruments may be difficult to price accurately. As a result, the savings association could initiate a swap with a negative market value or overpay for an option. Savings associations should be able to ascertain that the price and rate on a derivative instrument is consistent with current market conditions.

Illiquidity

Derivative use involves two types of liquidity risks. The derivative instrument may be illiquid, making the position difficult or expensive to unwind. Potential illiquidity is greatest with exotic derivatives.

Credit Risk

Credit risk is the potential for loss due to counterparty default. The evaluation of credit risk is particularly important in the case of OTC derivatives because the creditworthiness of counterparties can vary significantly. By comparison, the market views counterparty risk on exchange-traded contracts as minimal because the exchanges guarantee the performance of each contract. In addition, credit exposures on exchange-traded options are small because of the margin requirements and daily settlement practices imposed by the exchanges.

The credit risk of derivatives consists of two distinct elements: current exposure and potential exposure. Current exposure is the market value of

the derivative at any point in time. The market value of a derivative equals the net present value of the derivative's future cash flows and represents the cost of replacing the contract with a new one if the counterparty defaults.

The current exposure can be either positive or negative. When the current exposure is positive, the contract represents an asset and the holder of the contract will suffer a loss if the counterparty defaults. When the market value of the contract is negative, the contract represents a liability. Therefore, no credit loss occurs if there is a default since the contract has no value. The current exposure on exchange-traded contracts is negligible since exchanges require daily settlement of gains and losses on contracts.

The calculation of potential exposure incorporates possible changes in the market value of the contract as market conditions change. Market participants use various techniques, such as Monte Carlo simulation and option pricing models, to estimate potential exposures. For a credit loss to occur on a swap, two conditions must exist: the market value of the contract must be positive and the counterparty must default on the contract.

Only one side of an option contract confronts credit exposure. The writer (seller) of the option receives its fees up front, so only the buyer of the option faces a loss in the case of default. If the seller of the option defaults, the option buyer stands to lose the economic benefits associated with the option as well as an accounting loss equal to the unamortized option premium.

Savings associations must restrict their choice of counterparties to banks and well-capitalized nonbank entities. The market often uses collateral arrangements in derivative transactions to reduce exposure to counterparty risk. In swap transactions, collateral arrangements are subject to negotiation and can be either unilateral or bilateral. Under a unilateral arrangement, only the less creditworthy counterparty must post collateral. Under a bilateral arrangement, neither side posts collateral initially, but either side may need to post collateral later if a triggering event occurs. Triggering events include credit down gradings or sharp movements in interest rates.

When a party has two or more swap transactions involving the same counterparty, it uses a netting arrangement to reduce risk. Typical netting arrangements call for counterparties to net all transactions in the event of default. This means that all contracts between the two parties are marked-to-market, and those with negative values provide an offset against those with positive values.

Without netting arrangements, no offset occurs in the event of default. As a result, a practice known as cherry picking may occur. For example, a firm may have two swaps with the same counterparty— one with a positive replacement value and one with a negative replacement value. If the firm confronts bankruptcy, it may attempt to seek relief from the swap that has a negative replacement value (a liability) and attempt to force the counterparty to continue to pay on the swap with a positive value.

Legal Risk

Legal risk with OTC derivatives results from the fact that provisions may be unenforceable for the following reasons:

- Inadequate documentation.
- Illegality of the contract.
- Ineligibility of a counterparty to enter the transaction.
- Bankruptcy or insolvency of the counterparty.

Operational Risk

Operational risk is the potential for loss from a failure of internal systems and controls, human error, or fraud. Operational risk can arise from lack of management expertise and depth, excessive reliance on third parties, lack of involvement by senior management and the board of directors, and lack of checks and balances in derivative transactions.

HEDGING

Savings associations can reduce financial risk by hedging. Hedging can involve forward commitments, futures, options, and swaps.

Before engaging in any hedging strategy, management must review the savings association's overall interest rate risk position under various interest rate scenarios as required by Thrift Bulletin 13a. This evaluation would also include the effect of any hedge strategies.

Macro-hedging and Micro-hedging

The objective of a macro-hedge is to reduce the interest rate risk of a savings association based on a complete analysis of the balance sheet and off-balance sheet items. The objective of a micro-hedge is to reduce or eliminate the risk of a specific balance sheet or off-balance sheet item. Section 563.172 generally requires that the hedge positions reduce the interest rate risk of the institution.

You should not evaluate the appropriateness of a micro-hedge in isolation, but rather in the context of its effect on the overall interest rate risk of the savings association. Sometimes a micro-hedge can increase rather than reduce a savings association's overall interest rate risk. For example, a savings association that is liability sensitive can establish a micro-hedge to offset the interest rate risk of a fixed-rate mortgage-servicing portfolio. This portfolio may provide protection against an increase in interest rates, as the value of the portfolio would increase as interest rates increase and mortgage prepayments slow.

A well-constructed hedge (one developed with the benefit of an analysis of the overall interest rate risk) should meet the requirements of Statement of Financial Accounting Standard (SFAS) 133, Accounting for Derivative Instruments and Hedging Activities.

In June 1998, the Financial Accounting Standards Board (FASB) issued SFAS 133 as amended by SFAS 137, Accounting for Derivative Instruments and Hedging Activities — Deferral of the Effective Date of FASB Statement No. 133 (issued June 1999); and SFAS 138, Accounting for Certain Derivative Instruments and Certain Hedging Activities (issued June 2000). SFAS 137 became effective with fiscal years ending after June 15, 2000.

Management, in coordination with an independent audit firm, should establish a policy containing standards, parameters, and conditions to assess the required level of correlation and hedge effectiveness. SFAS 133 requires that a gain or loss from the item hedged be highly correlated to the gain or loss from the hedging instrument. SFAS 133 does not define high correlation. However, in practice, the gain or loss from the future contracts should equal no less than 80 percent to 120 percent of the change in value from the hedged instrument. SFAS 133 limits hedge accounting to those relationships in which derivative instruments and certain foreign currency-denominated nonderivative instruments are designated as hedging instruments and the necessary qualifying criteria are met.

Derivatives subject to SFAS 133 include, but are not limited to, interest rate swaps, options, futures, and forwards. In developing this complex proposal, the FASB concluded that the following five fundamental decisions should serve as cornerstones:

- Derivatives are assets or liabilities, and should be reported in the financial statements. (Prior to SFAS 133, most derivatives, except those held for trading, were "off-balance sheet" and, savings associations did not report them in the financial statements.)
- Fair value is the most relevant measure for financial instruments, and the only relevant measure for derivatives.
- Savings associations should measure derivatives at fair value, and adjustments to the carrying amount of hedged items should reflect changes in their fair value (that is, gains and losses) that are attributable to the risk being hedged and that arise while the hedge is in effect.
- Savings associations should report only items that are assets or liabilities in the financial

statements. (Savings associations should not defer and treat realized gains and losses on certain derivatives used for hedging as an asset or liability.)

- Savings associations should use special accounting for items designated as being hedged only for qualifying transactions; one aspect of qualification should be an assessment of offsetting changes in fair values or cash flows.

Accounting Treatment

Savings associations must account for and disclose hedging transactions and derivative instruments according to generally accepted accounting principles (GAAP). SFAS 133 is a significant accounting change that requires an institution to record all derivatives on the balance sheet as assets or liabilities at their fair value. Under SFAS 133, savings associations should report changes in the fair value of most derivatives in net income. However, savings associations should record the accumulated gains (losses) for derivatives that qualify as effective cash flow hedges, in other comprehensive income, a component of GAAP equity capital. SFAS No. 133 also requires certain disclosures.

Management should consult with its independent auditor to ensure compliance with GAAP. Where GAAP does not specifically address the accounting treatment for a particular derivative instrument, the savings association should document the accounting treatment they use and record the basis for the adopted treatment.

Evolving accounting and regulatory requirements makes it necessary to keep abreast of legislative, regulatory, and accounting initiatives that could affect the treatment of certain derivatives and influence their market values. On December 29, 1998, the FFIEC issued interim regulatory reporting and capital guidance that departs from GAAP. That guidance requires an institution that has adopted SFAS 133 to report derivative instruments as follows:

- Do not include accumulated gain (losses) for effective cash flow hedges in regulatory capital.
- Report accumulated gain (losses) for ineffective cash flow hedges and for all fair value hedges in net income. This affects the numerator for both the Tier 1 and risk-based capital calculations.
- Separately record and independently risk-weight embedded derivatives and the associated financial instrument.

Management should regularly perform worst-case scenario analysis that measures the potential effect on the savings association of changes in regulatory or accounting rules.

OTS POLICY ON DERIVATIVES

The Office of Thrift Supervision's rule on financial derivatives in § 563.172 permits savings associations to engage in transactions involving financial derivatives. The rule also describes the responsibilities of a savings association's board of directors and management regarding financial derivatives. In addition, Thrift Bulletin 13a (TB 13a) provides guidance on the use of financial derivatives.

Sensitivity Analysis or Stress Testing

Management should exercise diligence in assessing the risks and returns (including expected total return) associated with investment securities and financial derivatives. As a matter of sound practice, before taking an investment position or initiating a derivatives transaction, a savings association should:

- Ensure that the proposed transaction is legally permissible for a savings association.
- Review the terms of and condition of the financial derivatives.
- Ensure that the proposed transaction is allowable under the savings association's derivatives policies.

- Ensure that the proposed transaction is consistent with the savings association's portfolio objectives and liquidity needs.
- Exercise diligence in assessing the market value, liquidity, and credit risk of the financial derivatives.
- Conduct a pre-purchase portfolio sensitivity analysis for any significant transaction involving financial derivatives (as described below in Significant Transactions).
- Conduct a pre-purchase price sensitivity analysis of any financial derivative before taking a position.[1]

Significant Transactions

A significant transaction is any transaction (including one involving financial instruments other than complex securities) that is expected to increase a savings association's Sensitivity Measure by more than 25 basis points. Before undertaking any significant transaction, management should conduct an analysis of the incremental effect of the proposed transaction on the interest rate risk profile of the institution. The analysis should show the expected change in the savings association's net portfolio value (with and without the proposed transaction) that would result from an immediate parallel shift in the yield curve of plus and minus 100, 200, and 300 basis points. In general, a savings association should conduct its own analysis. It may, however, rely on analysis conducted by an independent third-party (that is, someone other than the seller or counterparty) provided management understands the analysis and its key assumptions.

Savings associations with less than $1 billion in assets that do not have an internal modeling capability to conduct such an incremental analysis may use the most recent quarterly NPV estimates for their institution provided by OTS. The association can use these NPV estimates to estimate the incremental effect of a proposed transaction on the sensitivity of its net portfolio value.[2]

Complex Securities and Financial Derivatives

Before taking a position in a complex security or financial derivative, a savings association should conduct a price sensitivity analysis (that is, a pre-purchase analysis) of the instrument. At a minimum, the analysis should show the expected change in the value of the instrument that would result from an immediate parallel shift in the yield curve of plus and minus 100, 200, and 300 basis points. Where appropriate, the analysis should encompass a wider range of scenarios (for example, nonparallel changes in the yield curve, changes in interest rate volatility, changes in credit spreads, and in the case of mortgage-related securities, changes in prepayment speeds). In general, a savings association should conduct its own in-house pre-acquisition analysis. A savings association may, however, rely on an analysis conducted by an independent third-party provided management understands the analysis and its key assumptions.

Risk Reduction

In general, the use of financial derivatives with high-price sensitivity[3] is limited to transactions and strategies that lower a savings association's interest rate risk as measured by the sensitivity of net portfolio value to changes in interest rates. A savings association that uses financial derivatives

[1] The following financial derivatives are exempt from pre-purchase analysis: commitments to originate, purchase, or sell mortgages. To perform the pre-purchase analysis for derivatives whose initial value is zero (for instance, futures, swaps), the savings association should calculate the change in value as a percentage of the notional principal amount.

[2] Savings associations that are exempt from filing Schedule CMR and that choose not to file voluntarily should ensure that no transaction – whether involving complex securities, financial derivatives, or any other financial instruments – causes the institution to fall out of compliance with its board of directors' interest rate risk limits.

[3] For purposes of TB 13a, complex securities with high price sensitivity include those whose price would be expected to decline by more than 10 percent under an adverse parallel change in interest rates of 200 basis points.

for a purpose other than reducing portfolio risk should do so according to safe and sound practices and should:

- Obtain written authorization from its board of directors to use such instruments for a purpose other than to reduce risk.
- Ensure that, after the proposed transaction(s), the savings association's post-shock NPV Ratio would not be less than four percent.

The use of financial derivatives or complex securities with high price sensitivity for purposes other than to reduce risk by savings associations that do not meet the conditions above, constitutes an unsafe and unsound practice.

Recordkeeping

Savings associations must maintain accurate and complete records of all derivatives transactions according to 12 CFR § 562.1. Savings associations should retain any analyses (including pre- and post-purchase analyses) relating to investments and derivatives transactions and make such analyses available to examiners upon request.

In addition, for each type of financial derivative instrument the board of directors authorizes, the savings association should maintain records containing the following information:

- The names, duties, responsibilities, and limits of authority (including position limits) of employees authorized to engage in transactions involving the instrument.
- A list of approved counterparties with which transactions may be conducted.
- A list showing the credit risk limit for each approved counterparty.
- A contract register containing key information on all outstanding contracts and positions.

The contract registers should specify the following information:

- Type of contract
- Price of each open contract
- Dollar amount
- Trade and maturity dates
- Date and manner in which contracts were offset
- Total outstanding positions.

Where deferred gains or losses on derivatives from hedging activities are consistent with generally accepted accounting principles (GAAP), the savings association should maintain appropriate supporting documentation.

GUIDELINES FOR THE BOARD OF DIRECTORS AND MANAGEMENT

A savings association's board of directors must manage interest rate risk prudently (12 CFR § 563.176). Under Part 570 Appendix A II, Operational and Management Standards, savings associations must have prudent policies, practices, and systems. These requirements include management of interest rate risk, assessment of asset quality, maintenance of internal controls and information systems and appropriate internal audit systems. Savings associations also must maintain and make available to you an accurate and complete record of transactions involving derivative products (12 CFR Part 562).

Derivatives Guidelines

Savings associations that use derivatives should adhere to the following guidelines.

Board of Directors' Approval

The board of directors should adopt and enforce a written policy authorizing and governing the use of derivative products. The policy should (1) identify authorized derivative products and (2) mandate record-keeping systems detailed enough to permit internal auditors to determine whether personnel have operated according to the board's authorization.

Management should report periodically to the board regarding compliance with the board's policies on the use of derivative products.

Interest Rate Risk Policy

Savings associations must have a comprehensive policy detailing their overall interest rate risk management and investment strategy, pursuant to 12 CFR § 563.176. That plan should include a description of the savings association's derivative strategy and objectives.

Internal Controls

A savings association should establish the following internal controls and procedures:

- Periodic reports to management.
- Segregation of duties.
- Adherence to internal policies and procedures.
- Prevention of unauthorized transactions and other abuses.

Segregation of Duties

Internal systems and procedures should segregate duties between those responsible for execution, record keeping, and verification. Management should designate those authorized to transact derivatives.

Position Limits

Management should establish specific position limits (expressed as dollar amounts, or as a percentage of assets or capital) for each major type of derivative product and for each counterparty. Savings associations can measure position limits in terms of either notional balances or value at risk (VAR). The VAR approach provides a more comprehensive indicator of credit and market risk because it considers the current market value and volatility of a derivative contract as well as its size. A ten-year swap has more credit risk and market risk than a two-year swap of the same notional balance because a given change in market interest rates has a greater effect on market value.

The limits should be consistent with the following characteristics:

- The savings association's intent.
- Level of management expertise.
- Sophistication of internal control and monitoring systems.
- Asset/liability structure.
- Capacity to maintain liquidity and absorb losses out of capital.

The board of directors, an authorized committee thereof, or the savings association's internal auditors should monitor conformance with such limits. Internal auditors should report their reviews to the board of directors or a committee of the board on a regular basis.

Aggregating Credit Exposures

Savings associations should aggregate credit exposures to a counterparty considering enforceable netting arrangements. The savings association should regularly calculate credit exposures and compare them to credit limits.

Marking-to-Market

Savings associations should mark their derivatives positions to market on a regular basis for risk management purposes.

Professional Expertise

Savings associations must ensure that they have adequate staff to undertake their derivatives activities. The staff must have the appropriate experience, skill levels, and degrees of specialization.

Savings associations should not place undue reliance on, or delegate decision-making authority to third-party investment advisors. Savings associations must document decisions they make on the recommendations of third parties. (The use of investment advisors should be according to the guidance provided in Handbook Section 540, Investment Securities.)

Counterparty Credit Analysis

Savings associations should control counterparty credit risk by limiting transactions to financially strong counterparties. Savings associations should conduct a credit analysis of the counterparty before entering into a transaction. In addition, associations should investigate the dealer's general reputation for fair and honest dealings with customers. Savings associations should also conduct an inquiry of appropriate state or federal securities regulators and securities industry self-regulatory organizations concerning any formal enforcement actions against the dealer, its affiliates, or associated personnel.

Savings associations that use derivatives should assess both the benefits and costs of credit enhancement and related risk-reduction arrangements. If credit downgrades would trigger early termination or collateral requirements, an association should carefully consider its own capacity and that of its counterparties to meet the substantial funding needs that might result.

Legal Review

Management should ascertain the rights and obligations of all parties to derivative transactions by carefully reviewing all related contractual and account documents, including margin and collateral requirements, and recourse arrangements. Management should thoroughly understand those rights and obligations to avoid possible misunderstandings.

Master Agreements

Savings associations that use derivatives should use one master agreement with each counterparty to document existing and future derivatives transactions, including options. Master agreements should provide for payments netting and closeout netting, using a full two-way payments approach.

Evaluation of Hedging Transactions

For hedging transactions, internal reports should show the market value of the derivative instruments and reconcile the gains and losses to the changes in the value of hedged balance sheet items. For example, if a savings association bought futures contracts to hedge the market value of a group of assets, the savings association should compare the performance of the futures contracts with the performance of the hedged assets to evaluate the overall performance of a hedging program. The savings association should perform an assessment of hedging effectiveness at least quarterly. Monthly assessment may be necessary for larger hedging transactions.

TFR Reporting

Savings associations report derivatives positions on Schedule CMR (Consolidated Maturity and Rate) of the Thrift Financial Report. In addition, savings associations indicate whether they have any outstanding futures and options positions on Schedule SQ (Consolidated Supplemental Questions).

Hedging Guidelines

There are numerous ways to hedge. Management must select the optimal method for hedging based on the institution's level of risk and the level of in-house expertise. Management must assess the potential costs and benefits of a hedge strategy before its implementation. The savings association must analyze the yield and price characteristics of the hedging instrument(s) and compare these characteristics to those of the hedged assets, liabilities, or off-balance sheet positions. Management should evaluate and document the pre-hedging analysis with various examples of the intended strategies and how these strategies would perform under varying interest rate scenarios.

The board of directors and management must consider the level of expertise needed to implement a hedge strategy. If using outside consultants, the savings association must have in-house personnel who thoroughly understand the consultants' recommendations. Management must maintain the final decision-making authority, but they can use the information provided by consultants and brokers. Following the advice of an outside consultant without a thorough understanding of the strategy is not an acceptable practice. Management should not rely solely on the advice of a broker to determine hedge ratios or when to estab-

lish or offset hedge positions. Since the broker's commissions depend on transaction volume, there may be an inherent conflict.

One of the keys to a successful hedging program is the expertise of management. Management must have adequate knowledge of various hedging instruments, a thorough understanding of asset/liability management techniques, and the savings association's current interest rate risk position under different interest rate scenarios. Management must also be able to explain the strategies and the methods used to evaluate the effectiveness of the hedging program without relying on assistance from outside consultants or brokers.

Policies, Procedures, and Recordkeeping Requirements

Savings associations that engage in hedging transactions must have specific written policies and internal control procedures regarding these activities. Policy objectives must be specific enough to outline permissible strategies and take into account:

- The price and yield correlations between assets or liabilities and the hedging instruments with which they are matched (that is, the hedge ratio).
- The relationship of the strategies to the institution's operations.
- How the strategies reduce interest rate risk.

If the hedging program involves complex strategies, documentation should include examples of the intended strategies. The hedging policy should reflect changes in hedging strategies.

The written policy should establish position limits and the parameters by which the board of directors and management will monitor the effectiveness of the hedging program. The board should authorize the individual(s) responsible for executing hedging transactions and establish limits of authority for the individual(s). The board should also approve the selection of consultants and brokers and set specific limitations on the level of authority granted. Policies and procedures should include the segregation of duties between the execution of hedge positions and the transfer of funds. Monthly monitoring reports should detail the volume of transactions, all outstanding positions, the unrealized gains or losses on these positions, and the realized gains or losses from closed positions.

Savings associations must document and monitor all facets of hedging programs, and maintain contract registers for all financial derivatives. The contract registers should specify the type of contract, the price of each open contract, the dollar amount, the trade and maturity dates, the date and manner in which contracts offset each other, the offset gain or loss, and the total outstanding positions. Savings associations must maintain a schedule of the hedged assets and/or liabilities and document the method used to determine the dollar amount of the hedging instrument. The savings association must also maintain documentation on the following:

- Deferred gains or losses from hedge positions.
- Correlation between the gain or loss from the hedging instrument.
- Change in value of the item hedged during the hedge period.
- Method used to amortize any deferred gains or losses from hedge positions.

TYPES OF DERIVATIVE INSTRUMENTS

Swaps

Interest Rate Swaps

Interest rate swaps are the most common type of financial derivative used by savings associations. An interest rate swap is an agreement between two parties to exchange a series of cash flows (based on notional principal amounts) at specified intervals known as payment or settlement dates. The parties do not exchange actual principal amounts. Instead, the parties usually net interim payments, with the net amount being paid to one party or the other.

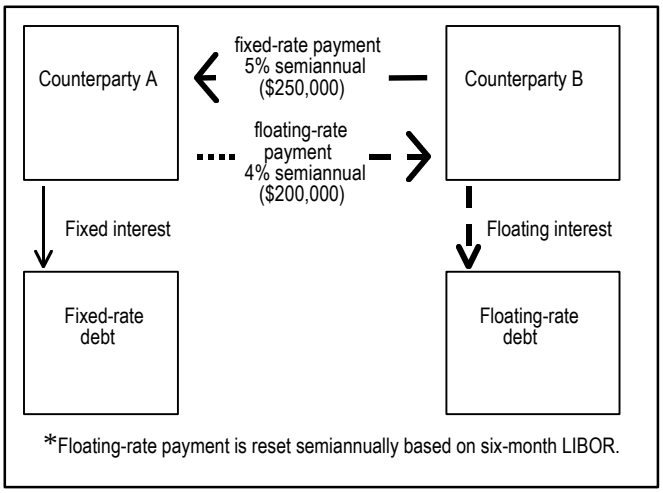
Savings associations use interest rate swaps primarily to manage interest rate exposure and to reduce debt-financing costs. Swaps transform an existing cash flow stream into a more desirable one from the point of view of a financial institution. For example, a savings association can use a swap to transform floating-rate liabilities into fixed-rate liabilities. Because the parties negotiate swap contracts, they can swap virtually any kind of payment stream. The most common type of swap is the fixed-for-floating interest rate swap.

With a fixed-for-floating interest rate swap, one party exchanges a fixed-rate interest payment stream for a floating-rate payment stream. The party that agrees to make fixed-rate payments is the fixed-rate payer, and the party that makes the floating-rate payments is the floating-rate payer. In this instance, a fixed-for-floating swap enables the fixed-rate payer to transform floating-rate liabilities into fixed-rate liabilities. A party could also transform fixed-rate assets into floating-rate assets.

Figure 1 shows an example of a fixed-for-floating interest rate swap. In this example, Counterparty A has $10 million of fixed-rate borrowings that it wants to convert into floating-rate borrowings. Counterparty B has $10 million of floating-rate borrowings that it wants to convert into fixed-rate borrowings. Both parties agree to enter into an interest rate swap with a notional amount of $10 million. The agreement requires Counterparty B to make semiannual payments to Counterparty A at a fixed rate of five percent for three years. In exchange, Counterparty A agrees to make floating-rate payments based on the six-month London Interbank Offered Rate (LIBOR) with an initial rate of four percent.

In the example, B (the fixed-rate payer) will make a net payment of $50,000 to A (the floating-rate payer) on the first semiannual payment date. On that date, the floating rate for the next six months resets based on the prevailing six-month LIBOR. If six-month LIBOR increases after the swap is initiated, A's cost of funds will rise because it is obligated to make floating-rate payments to B. On the other hand, B, will benefit if rates rise, since it will receive higher floating-rate payments, while its payments remain fixed at five percent of the notional amount. Savings associations exposed to rising rates (for example, the typical savings association holding interest-bearing deposits) can reduce their exposure by entering into fixed-for-floating swaps as the fixed-rate payer.

Figure 1
Fixed-for-Floating Interest Rate Swap



Basis Swaps

Basis swaps involve the exchange of payments based on two different floating-rate indices, such as one-month LIBOR against the Eleventh District Cost of Funds Index (COFI). For example, a pay-COFI, receive-LIBOR swap effectively converts a COFI ARM into a LIBOR ARM, allowing the savings association to match LIBOR-indexed borrowings more closely. The market also calls basis swaps floating-for-floating swaps.

Swap Termination

A savings association may wish to reverse or terminate (unwind) a swap before maturity. There are two ways to unwind a swap position. One way is to negotiate a termination settlement with the original counterparty. The other is to enter into a new swap that is a mirror image of the existing swap to offset the existing position.

Swap Variations

Most swaps have a specified maturity date and a fixed notional amount. Some swaps, however, have notional amounts that amortize over time. Swaps can also be callable, where one of the counterparties has an option to terminate the swap if interest rates increase or decrease beyond the strike rate. A forward swap is a firm commitment to enter into a swap at a specified future date.

Uses and Evaluation of Swaps

Swaps can synthetically extend the term of a matched liability over the term of the swap in much the same way as futures contracts are used to fix financing costs. However, swaps do not require the same active management that futures or options positions require. Swaps are not as liquid as futures contracts. A savings association can offset a swap position and, in effect, cancel it if they negotiate an offset with the counterparty or enter into a reverse swap with terms that are similar to the original swap agreement.

To evaluate the appropriateness of a swap agreement, management should monitor the correlation of the effective spread from the assets and liabilities being hedged by using a swap with a fixed-rate payable and a variable-rate receivable. For example, if a savings association enters into a five-year swap where the fixed interest rate is nine percent and the variable rate on the first payment date is seven percent, the savings associations must pay 200 basis points. However, if the savings association matches the swap, you should compare the variable rate with the rate paid on the matched short-term liability to determine how closely the variable rate received from the swap correlates. If these rates correlate well and the assets funded by the matched liability have a duration of approximately five years, the association may achieve a "locked-in" spread.

Forward Contracts

A forward contract obligates one counterparty to buy, and the other to sell, a specific underlying financial instrument at a specific price, amount, and date in the future. Contracts specifying settlement in excess of 30 days after the trade date are forward contracts. Forward contracts exist for a multitude of underlying assets, including currencies, commodities, and mortgages. Forward contracts trade over-the-counter and counterparties customize these contracts to fit their particular objectives.

Figure 2
Profit of Forward Contract - Long Position

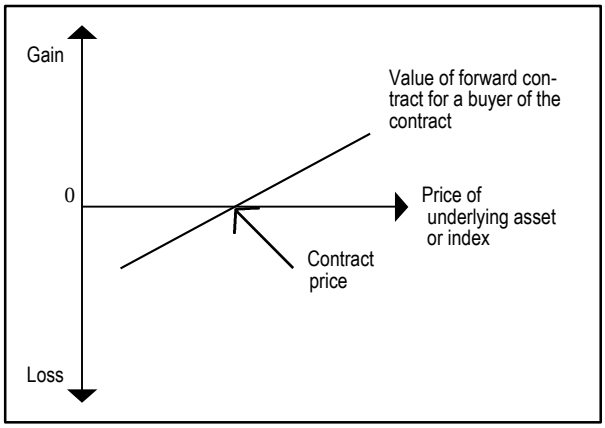


Figure 2 shows the payoff profile of a forward contract. As shown, the change in the value of a forward contract is roughly proportional to the change in the value of the underlying asset or index. The value of the contract conveys at maturity through cash settlement or delivery. If, at maturity, the price of the underlying is higher than the contract price, then the buyer makes a profit. The gain to the buyer equals the loss to the seller.

Forward contracts create two-way credit risk. The counterparty on the side of the contract that has a positive replacement value confronts the credit risk of the other party. However, the market value of a contract can change from a positive value to a negative value, and vice versa. Therefore, each party must assess the creditworthiness of its counterparty because each side may experience a potential gain or loss. The value of the forward contract conveys on the maturity date of the contract. Neither party makes payments at origination or during the life of the contract. The contract owner will either receive or make a payment at

maturity, depending on the price movement of the underlying asset or index.

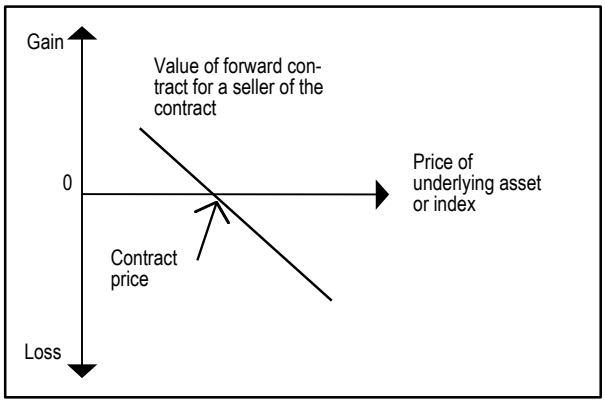
Mortgage bankers often use forward contracts to hedge the price risk of holding loans temporarily. The forward sale of mortgage loans transfers the price risk of holding mortgages in the pipeline to the counterparty. Figure 3 shows the payoff profile of a forward sale. The seller of the forward contract is short the underlying asset, and therefore gains if the value of the underlying asset declines. In a short position, the writer (seller) of a forward contract must fulfill the obligation of the contract.

Forward contracts to sell mortgage production can be either firm or optional commitments. Firm commitments require both parties to perform on the contract (delivery of mortgages or cash settlement), regardless of market conditions. In contrast, optional commitments, such as standbys, require performance only at the option of the party that purchased the option.

Savings associations typically attempt to match the terms of the forward agreement to the terms of the underlying asset that causes the risk exposure. For example, assume a savings association originates 30-year fixed-rate mortgages and expects to close most of these loans within a 45-day period. As loan production accumulates, the savings association enters into a firm forward commitment to sell 30-year loans with a settlement date 45-days in the future. For the portion of the pipeline that is uncertain as to closure, the savings association may use a standby agreement to hedge the interest rate risk.

In general, forward contracts to buy mortgages or mortgage-backed securities will increase the overall interest rate risk exposure of a typical savings association. You should examine long forward positions to determine if they are being used for speculative purposes. In a long position, the purchaser (holder) of an option contract has the right to exercise the option against the option writer.

Figure 3
Profit of Forward Contract - Short Position



Hedging with Forward Commitments

Savings associations can use firm or standby forward commitments to sell loans or securities as an economic hedging vehicle to reduce the interest rate risk of holding long-term, fixed-rate mortgages or securities in portfolio or in the loan pipeline. (Refer to the Mortgage Banking sections of the Thrift Activities Handbook.) Commitments to sell at the current market price can provide protection against the risk of declining market value associated with rising interest rates. Some savings associations enter into firm commitments to sell securities (short positions) with a dealer, but rather than deliver the securities at settlement, pair off (offset/buy back) the short positions. If interest rates rise during the commitment period, the commitments can usually be paired off at a gain.

Standby commitments to sell provide flexibility since the savings association can select the amount and cost of coverage. The maximum loss for a standby commitment to sell is the amount of the fee. The amount of the fee depends on the length of the commitment, the relationship between the market value of the underlying security and the commitment price, and the volatility of the underlying security. To determine the appropriateness of using standby commitments to sell, you should assess the cost of the option versus the amount of protection obtained.

You should review forward commitment and pair-off activity for safety and soundness. Significant losses can result from improper use of commitment contracts.

You should check for pair-off positions, where the savings association closes out forward positions before settlement with offsetting forward contracts, usually at a profit. You should review pair-offs in a held-to-maturity portfolio to determine if they constitute trading activity. While pair-offs can represent an acceptable element of a mortgage pipeline-hedging program, excessive pair-off activity may indicate an inefficient hedging process and should receive additional scrutiny. Regulators should determine whether the activity represents an economic hedging strategy or simply a speculative trading activity. To be considered a prudent economic hedging activity, the hedged items (existing or anticipated) the association must meet the following criteria:

- Identify the hedged item.
- Document the purpose of the hedge.
- Justify the hedge ratio based on historic correlation.
- Monitor and maintain the correlation throughout the hedge period.
- Evaluate and justify the effectiveness of the strategy for risk exposure.

Savings associations that use commitments (firm or standby) to hedge the loan pipeline must also document the estimate of fallout since this variable will materially affect the outcome of the hedge. Conversely, you can identify speculative trading activity by the following indicators:

- High volume of purchase and sale and/or pair-off activity.
- Positions held for only short periods.
- The lack of requisite documentation.
- Correlation analysis appropriate to a prudent economic hedging strategy.

Futures Contracts

A futures contract is a legally binding agreement to make or take delivery of a standardized quantity and quality of a commodity or financial instrument on a specified date in the future. The value of a futures contract reacts to changes in the price of the underlying commodity or financial instrument in much the same manner as the value of forward contracts. Futures contracts trade on recognized exchanges, and an exchange clearinghouse is the counterparty to each trade.

Futures contracts based on a financial instrument or a financial index are financial futures. Financial futures include interest rate futures, stock futures, and currency futures. Financial futures can be an effective means of controlling interest rate risk for savings associations. The most commonly used interest rate futures are those with Treasury bills, notes, and bonds, and Eurodollar CDs as the underlying asset.

The buyer of a futures contract takes a long position in the market and is long on the futures contract. The buyer can sell the contract at any time before settlement. In the case of an interest rate futures contract, such as a Treasury bond contract, a long position will make a profit if interest rates decline. Lower interest rates mean higher contract prices because there is an inverse relationship between interest rates and bond prices. Conversely, an increase in interest rates will produce a loss on a long position. The payoff profile of a long futures position is the same as that of a long forward contract position (see Figure 4). Note that futures contracts obligate their owners to purchase a specified asset at a specified exercise price on a specified maturity date.

The seller of a futures contract takes a short position in the market. In essence, the seller promises to deliver a commodity or financial asset even though he/she may not own the asset. A short position in a Treasury bond contract will produce a profit if Treasury bond prices decline (that is, if Treasury bond yields increase). Selling a futures contract (a short position) is an example of a hedging strategy that savings associations can use to reduce their interest rate risk exposure if the savings association will lose value when interest

rates rise. Figure 5 shows the payoff profile of a short futures position in Treasury bonds.

Figure 4
Profit of Futures Contract - Long Position

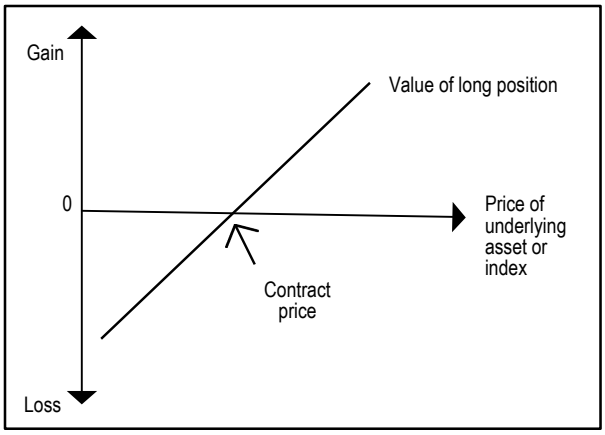
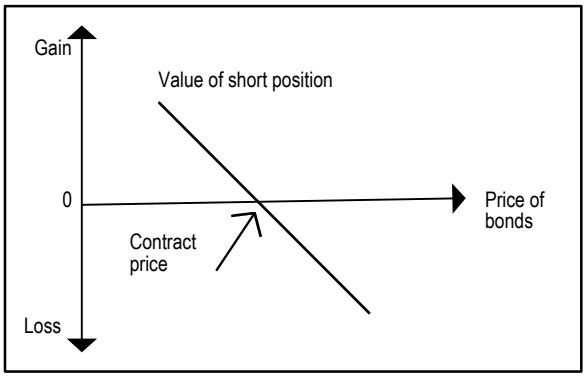


Figure 5
Profit of Treasury Bond Futures Contract - Short Position



Compared with swaps and forwards, the credit risk of futures contracts is minimal for three reasons:

- Values of futures contracts reflect daily marked-to-market changes. Any change in the value of the futures contract conveys, (that is, settled in cash) at the end of each trading day. In contrast, the value of a forward contract conveys in a single payment at maturity. With a swap contract, changes in value convey periodically throughout the life of the swap on each settlement date.

- Buyers and sellers of futures contracts must post a performance bond, known as initial margin, with their brokers. The customer must establish an initial margin account when opening the contract. The broker adds or subtracts gains and losses on the futures contract from the margin account at the end of each day. If losses cause the margin account to fall below a specified level, the customer must post additional margin, or the broker will close out the account.

- An exchange clearinghouse is the counterparty to each futures transaction.

Hedging with Future Contracts

There are numerous hedging strategies using futures contracts. You must evaluate each strategy on a case-by-case basis. A description of some of the commonly used strategies and some of the risks of these strategies follows:

- Savings associations that attempt to hedge fixed-rate mortgages or mortgage-backed securities (MBS) with futures contracts based on either Treasury bond or Treasury note futures contracts have significant cross-hedging risk. Treasury bond futures contracts provide greater liquidity. When interest rates decline, Treasury bond futures contracts will increase in value because these contracts track cash market Treasury bonds. These bonds have set maturity dates. Therefore, when interest rates decline, these securities will increase in value much more than a MBS with the same stated maturity (positive convexity). However, the potential for value changes in the MBS will depend on the duration of the MBS, which will vary based upon the prepayment experience of the underlying mortgages (increased prepayments yield a shorter duration).

  Because the price of the MBS exceeds the par value, price appreciation is limited (due to negative convexity). This occurs because a

premium MBS results when the coupon rate exceeds the comparable interest rate for current mortgages. If the interest rate on the mortgages underlying the MBS significantly exceeds the prevailing mortgage interest rate, the probability of refinance increases. This causes the duration of the MBS to decrease faster than the duration of the Treasury bond that underlies the futures contract. If interest rates decrease, the losses from the futures positions could significantly exceed the appreciation on the MBS.

You should closely review any hedging strategy that uses Treasury futures matched against MBSs. You should also scrutinize the methods used to determine the number of futures contracts and the monitoring techniques used by management.

- Savings associations engaged in fixed-rate mortgage lending activity may attempt to protect the value of the loan pipeline by hedging. The savings association must estimate the amount of loans expected to close and quantify the risk. They may use futures contracts.

- Some savings associations attempt to synthetically extend the terms of their short-term liabilities by matching futures contracts based on short-term instruments against them. They normally use Eurodollar and Treasury bill futures contracts (par value of $1 million) based on 90-day instruments. In this strategy, one determines the number of contracts by comparing the maturity of the hedged liability with the maturity of the instrument underlying the futures contract used. If the maturity of the liabilities and the instruments underlying the futures contract are equal (for example, both 90 days), the savings association uses a one-to-one hedge ratio. That is, for each $1 million of liabilities hedged, there is one futures contract. If the association hedges liabilities with a maturity of six months, there are two 90-day futures contracts for each $1 million of hedged liabilities. There is a high correlation between the savings association's method for setting the interest rates on its liabilities compared with the money market interest rate that determines the yield on the instruments that drive the futures contracts used.

Contract Placement of Futures

Once the savings association determines the number of contracts, the savings association must select the maturity date of the futures contract. If the savings association decides to place the hedge position in futures contracts that mature at approximately the same time that the liabilities reprice/roll over, this produces a stripped hedge. If the savings association decides to concentrate all or most of the contracts in the futures contract with the most recent contract maturity, this produces a stacked hedge.

To illustrate the structure of a stripped versus a stacked hedge, assume that on June 15, 2001, a savings association decides to hedge for one year $10 million of 90-day certificates of deposit (CDs) that will next reprice/roll over on September 1, 2001. To establish a stripped hedge, the savings association sells ten September 2001, ten December 2001, ten March 2002, and ten June 2002 futures contracts. At each contract maturity date, ten contracts will close. To establish a stacked hedge, the savings association does not place the contracts evenly by contract month over the hedge period. Instead, the savings association places all forty contracts in the nearby September 2001 contracts. When the CDs roll over in September, the association closes out ten of the futures contracts, but rolls forward thirty into December 2001 contracts. Similarly, in December 2001, an additional ten contracts close and the remaining twenty roll into March 2002 contracts. The last ten contracts close in June 2002.

Stacking contracts, as opposed to selling a strip of contracts covering the hedge period, involve decisions pertaining to the yield curve and contract liquidity. A hedge manager may establish a hedge position in a nearby contract because these contracts are normally more liquid than the more distant contracts. The hedge manager may stack the hedge position if he anticipates that the yield curve will steepen, as these contracts should provide a greater future gain relative to the nearby contracts. The manager may stack the hedge position in the nearby contracts, if he anticipates that the yield curve will flatten or invert. When re-

viewing stack hedges, it is important to determine that the motivation for the hedge transactions is to reduce the risk of the hedged item and to achieve a high level of correlation, and not to speculate on yield curve fluctuation.

Margin Requirements on Futures Contracts

The savings association must post the initial margin when they establish a futures position. This can be cash, pledged government securities, or irrevocable standby letters of credit. Initial margin requirements for Treasury bonds, Treasury bills, Eurodollars, and futures contracts are normally less than two percent of the contract par value. This margin serves as a good faith deposit, guaranteeing performance.

The value of the futures contract is marked-to market-daily, and all changes in value settle daily in cash. The daily dollar value that changes hands is the variation margin. If the futures positions have losses, the savings association must post additional margin. The savings association may also withdraw funds equal to the unrealized gains from the margin account.

A savings association must have sufficient funds to cover any calls for variation margin. If the savings association has a large open short futures position, there is the potential for large unrealized losses if interest rates decline. You should consider the opportunity cost of variation margin deposits when evaluating the effectiveness of the hedging program.

Options

The writer (or seller) of an option sells this contract to a buyer in exchange for a sum of money called the option premium, or the option price. The holder can exercise an American option at any time during the life of the contract. A holder can only exercise a European option on the expiration date. Option contracts trade on exchanges and in the OTC (over-the-counter) markets.

For exchange-traded options, the exchange establishes standardized terms. Conversely, the terms for OTC options (for example, standby commitments) will vary significantly depending on the participants of the agreement. Usually, exchange-traded options will have more liquidity than OTC options once market participants have accepted the contract. However, exchange-traded options track only a limited number of cash market instruments.

Characteristics of Options

A savings association can purchase (long position) or sell (short position) an option. Options differ from futures in that the holder of a option has the right to purchase or sell versus the obligation to purchase or sell with futures. In return for the right to buy or sell securities, put and call option buyers pay a negotiated premium to put and call option sellers. The seller of the option must perform if the holder exercises the option. Options can provide more flexibility than futures because the savings association can establish a wide variety of positions.

Mathematical models that represent the fair value of options use variables such as the relationship between the market and strike price, the term remaining until option expiration, marketplace volatility, and short-term interest rates. These models are based on the concept that the option premium has two components: an intrinsic or in-the-money value and time value. Intrinsic value is the amount by which the current market price of the underlying security is above the strike price for calls and below the strike price for puts. Time value is the amount by which the premium exceeds the intrinsic value.

Because option buyers have no obligation to perform after paying the premium, there is no additional margin required. Option writers undertake a firm commitment to assume a long or short position in the market at the strike price if they exercise the option. Because the seller/writer must perform, a margin deposit is required when a position is opened.

Sellers can structure OTC option transactions to meet the specific requirements of the purchaser, thereby providing more flexibility than exchange-traded options. The trade-off is that OTC options are not standardized and usually must be offset by the original counterparty, thereby limiting their

liquidity. OTC transactions most commonly involve options on MBSs.

The buyer of an option holds a long position, while the seller (writer) holds a short position. When the writer of the option owns the underlying asset, the option position is covered. When the writer does not own the underlying asset, the writer's position is naked. An option is in the money, if exercising the option produces a gain, while an option is out of the money if exercising the option does not produce a gain.

The following five factors influence the value of an option:

- Strike price.
- Current price of the underlying instrument.
- Time to expiration of the contract.
- Expected volatility of yields (or prices) over the remaining life of the option.
- Short-term risk-free interest rate over the remaining life of the option.

Hedge Ratios for Options

As with other hedging instruments, some savings associations use the par value approach, thereby matching the contract par value of the options with the hedged item. This method of determining a hedge ratio can be flawed. However, regardless of the approach, if the savings association uses long puts or calls, the maximum losses are the amount of the option premium. Therefore, the savings association knows the potential losses from basis risk.

Some savings associations use the delta of an option to determine the necessary number of contracts to use in hedging. Option valuation models generate the delta of an option. It represents the expected change in the option premium for a given change in the price of the underlying instrument. For example, a delta of 0.5 indicates that if the price of the underlying instrument changed by one dollar, the option premium would change by only 50 cents. A savings association using the delta would use the reciprocal of the delta to determine the number of options contracts. In this example, 1.0 divided by 0.5 would equal two options contracts.

Savings associations should be careful when relying on this measure to determine the number of option contracts. The delta changes frequently, resulting in a continually changing hedge ratio. If the option is out-of-the-money [exercise price is lower (higher) than market price for puts (calls)], this could result in a significant number of option contracts. For example, if the delta were 0.1, the option premium would change 10 cents for each dollar change in the price of the underlying instrument. If a savings association used this strategy to offset the price sensitivity of the instrument underlying the option, they would use a ratio of 10 option contracts for each dollar of matched items. However, the savings association may not hold in portfolio the security that underlies the option. If the savings association matched the option position against an asset or liability that differs from the instrument underlying the option, the delta will not be as accurate.

Basic Strategies using Options

Numerous strategies use options, including complex combinations of option positions and combinations of options and futures positions. The following subsections describe these strategies.

Caps, Floors, and Collars

Customized interest rate options that savings associations use to manage interest rate risk include interest rate caps, floors, and collars. A cap is a contract that provides a buyer with protection against a rise in interest rates above some specified rate. The contract specifies an underlying interest rate index. The most common index is LIBOR. The buyer pays a premium for the option. The contract will specify the notional amount of the contract, the maturity, the settlement frequency, the interest rate index, and the level of protection (for example, the strike rate of the cap). A strike price is the price one can buy, sell, or settle the underlying instrument upon exercise of the option contract.

A savings association can use a cap to set synthetically a maximum rate, or cap, on floating-rate borrowings. If rates rise above the cap rate, the savings association will receive a payment that will offset the increase in interest expense on the floating-rate borrowings above the cap rate. Thus, a savings association can use a cap to fix the maximum rate that it would pay out on a floating-rate obligation, while allowing the savings association to benefit from a decline in rates. (A savings association can also sell a cap to generate income through receipt of a premium. You can consider the sale of caps inappropriate if it exposes the savings association to an excessive amount of interest rate risk.)

A floor is an option contract that provides the buyer with protection against declining interest rates.

A commercial bank with a relatively large portfolio of floating-rate loans might, for example, buy a floor to protect its net interest earnings against a decline in rates. For a premium, the buyer of a floor receives the difference between the strike rate (floor) and the actual rate on the index if the index falls below the floor. No payments exchange hands if the strike rate on a floor is greater than the current index rate. The seller of a floor receives a premium. You can view a floor as a series of call options.

A collar is a combination of the purchase of a cap at one rate and the sale of a floor at another rate. The cap and floor rates usually ensure that the cost of the cap equals the premium on the floor, resulting in a zero cost collar. For a savings association exposed to rising rates, a collar provides protection if interest rates increase above the strike rate on the cap. But, in exchange for that protection, the savings association gives up the benefits of lower funding costs if rates fall below the strike rate on the floor.

Swaptions

A swaption (or swap option) is an option on a swap. It gives the buyer the right, but not the obligation, to enter into a specified swap at a future date.

Standby Agreements

A standby agreement is an OTC put option on mortgages or mortgage-backed securities. Usually mortgage bankers use these agreements to offset the risk of loans that they expect to close if interest rates increase, but are otherwise uncertain as to the closure date. A savings association pays a fee to purchase this protection.

Short standby positions (short puts) involve the receipt of a fee up front for assuming the risk of having to purchase loans at a price above market price. Short puts are usually speculative. You should view them as speculative, unless a savings association can demonstrate otherwise.

Calls

A call option gives the holder (the buyer or long position) the right to buy the underlying asset at a predetermined strike price at a specified time. The buyer of a call option benefits if the price of the underlying asset rises above the strike price by an amount sufficient to cover the option premium. If the holder does not exercise the option before expiration, the option will expire worthless. The profit potential of the long call position is substantial, while the option premium is the maximum loss possible on the option. Figure 6 shows the payoff profile of a long call position.

Figure 6
Profit on Call Option - Long Position

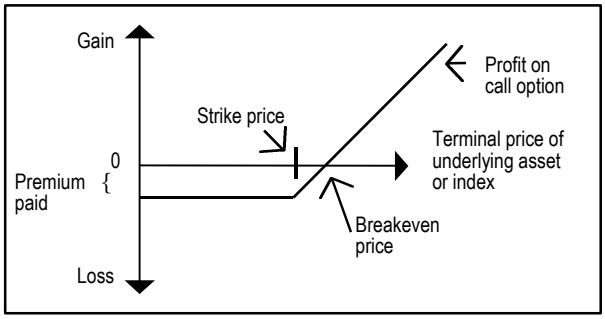


Figure 7
Profit on Call Option - Short Position

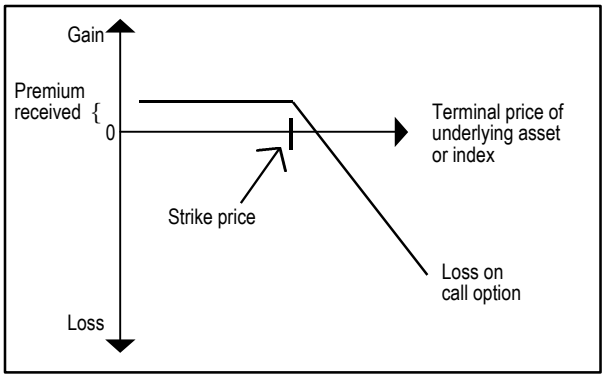


Figure 7 shows the payoff profile of the seller of a call option (the short position). Note that the payoff profile of a short call option position is the opposite of a long call position. Also, the profit potential of a short call position is only the amount of the option premium, while the loss potential is unlimited.

- Writing Calls

This strategy enhances the yield of securities in a portfolio. In return for a specified option premium, the savings association commits to deliver securities at a specified price within a specified time at the option of the purchaser. The savings association also receives the interest income from the securities and records any discount or premium for the securities during the term of the option. If interest rates remain stable, the time value component of the option premium will decline in value, thus benefiting the call writer. This decrease in the value of the option premium enhances the call writer's yield.

Call writing does not provide a hedge. If interest rates increase, the only protection the strategy provides is the amount of the option premium. To reduce risk in call writing, the savings association should hold in portfolio the security that underlies the call option contract. The exercise price of the call agreement should equal or exceed the book value of the securities in portfolio. If interest rates decrease and the market value of the underlying instrument exceeds the commitment price, the option is exercised. If the savings association has the underlying security in portfolio and the exercise price of the call agreement exceeds the book value, the savings association will have only an opportunity loss. If the book value is greater than the exercise price and the securities are called away, the savings association must recognize the losses. Pursuant to SFAS 115, the savings association must classify the securities matched with short calls as either available for sale or trading.

An uncovered, or naked, short call option position can entail significant risk. This strategy involves selling call options matched against a security in portfolio that is not deliverable into the call option. One high-risk strategy is to short calls on Treasury bond futures and match this position against fixed-rate mortgages. If interest rates decline, the losses from the call positions driven by Treasury bond futures contracts can greatly exceed any benefit from the matched asset. The risks of matching Treasury bond futures against MBSs are discussed in the futures section.

- Purchasing Calls

For most savings associations with long-term assets and short-term liabilities, OTS does not consider the purchase of call options to be a hedge. The call provides the right to purchase the underlying securities at a specified price within a set time. When interest rates increase, call values decline, thereby providing no protection against rising interest rates.

Although not considered a hedge, some savings associations buy call options as a proxy for an investment in long-term assets. Instead of buying long-term securities, the savings association purchases call options with a portion of the funds and invests the remainder in short-term assets. If interest rates increase, the return from this strategy will be the interest income from the short-term investment reduced by the cost of the calls. This eliminates the unrealized losses that would have occurred on long-term securities. If interest rates decrease, the return will equal the interest income from the short-term investment plus the gain from the call options. For strategies of this type, the

savings association should establish reasonable limits on the amount of the premium invested.

Other strategies involving long calls include buying call options to offset the losses that can result from mortgage loan pipeline fallout, prepayment risk from a mortgage portfolio, or prepayment risk from a servicing portfolio. Some savings associations that have structured their balance sheets with longer-term liabilities and shorter-term assets may also use long calls to reduce the risk of decreasing interest rates.

You should consider any strategy involving long calls in conjunction with the regulatory capital position and the overall asset liability structure of the savings association. The savings association should have sufficient capital after providing for the write-off of the entire dollar amount of the option premium.

Puts

A put option gives the holder (the buyer, or long position) the right to sell a designated asset (or instrument) to the option writer at a specified price at a specified time. The buyer of a put option benefits if the price of the underlying asset or investment declines by an amount sufficient to cover the option premium. Figure 8 shows the payoff profile of a long put position.

Figure 8
Profit on Put Option - Long Position

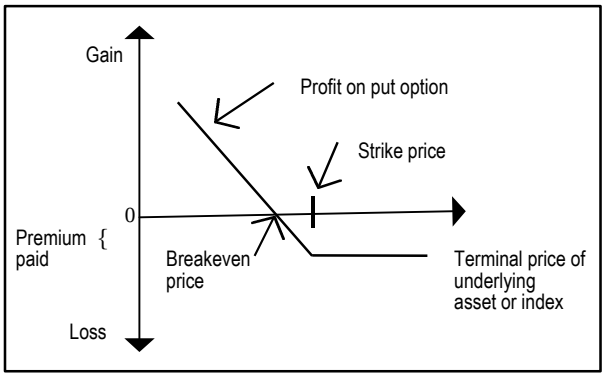


Figure 9
Profit on Put Option - Short Position

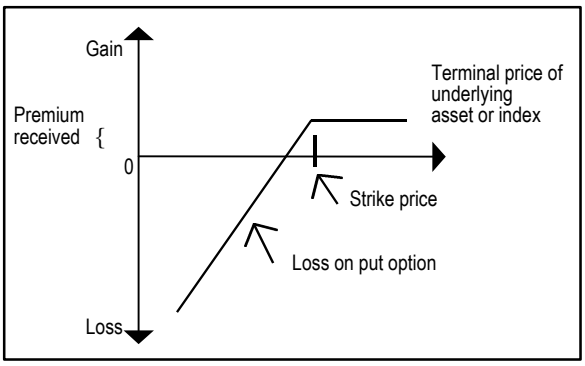


Figure 9 shows the payoff profile of a short put option. Like a short call, the profit potential on a short put is only the premium received for writing the option. However, while the downside potential is substantial, unlike a short call, it is limited.

- Short Puts

For most savings associations, OTS considers short put positions to be speculative transactions. In this strategy, the savings association receives a fee. In return, the savings association must buy the underlying security within the specified time at the strike price should the holder exercise the put option. The savings association expects interest rates to decline or remain stable. The maximum gain is the option premium received. The risk is equivalent to the amount by which the underlying instrument could potentially decrease in value during the term of the option if interest rates increase.

The regulations also require that the savings association record these positions at their immediate exercise value. If interest rates increase and the value of the instrument underlying the option decreases below the exercise price of the option, the savings association must record the difference as a loss through operations. The savings association must periodically adjust losses while the short put positions remain outstanding.

Combination Strategies using Options

Certain strategies involve the simultaneous purchase and sale of various options positions with different exercise prices and/or different settlement dates. For example, a savings association could purchase both a put and a call. This strategy attempts to profit from interest rate volatility. Other examples could involve the savings association simultaneously buying put or call options with different exercise prices. You must closely review any activity of this type to assess the rationale for the transactions, the risk and gains or losses.

Mortgage-Derivative Products

Some savings associations attempt to establish an economic hedge using the following instruments as hedging vehicles:

- Mortgage derivative securities such as interest only (IO) and principal only (PO) stripped mortgage-backed securities.
- Residuals and principals of real estate mortgage investment conduits (REMICs).
- Collateralized mortgage obligations (CMOs).

As hedging transactions, management should maintain reports tracking the market value of the derivative instruments and reconcile the gains and losses to the changes in the value of the hedged balance sheet items. For example, if a savings association bought $100 million in premium IOs to hedge the market value of $300 million of MBSs the savings association should compare the gains (losses) on the IOs with the losses (gains) on the MBSs to determine the net gain or loss from the transaction.

You should evaluate the appropriateness of using mortgage derivative products in the context of a savings association's total portfolio. In general, savings associations should limit the use of derivatives to transactions that lower or do not increase their overall exposure to interest rate risk.

Savings associations may use mortgage derivatives as an economic hedge; however, OTS considers them to be cash market instruments that do not qualify as a hedge for accounting purposes. The hedging instrument (for example, IO) may require adjustment from time to time to reflect changes in prepayments and differences in convexity. Management should consult with its independent auditor to assure compliance with GAAP.

In addition to SFAS 133, Emerging Issues Task Force (EITF) Bulletin 89-4 provides guidance on the GAAP treatment for CMO residuals and IOs.

REFERENCES

Code of Federal Regulations (12 CFR)

Part 562	Regulatory Reporting Standards
§ 563.170	Examinations and audits
§ 563.172	Financial Derivatives
§ 563.176	Interest Rate Risk Management Procedures

Financial Accounting Standards Board, Statement of Financial Accounting Standards (SFAS)

SFAS No. 52	Foreign Currency Translation (amended and certain paragraphs superseded by No. 133 as amended)
SFAS No. 80	Accounting for Futures Contracts (superseded)
SFAS No. 105	Disclosure of Information about Financial Instruments with Off-Balance Sheet Risk and Financial Instruments with Concentrations of Credit Risk (superseded)
SFAS No. 107	Disclosures about Fair Value of Financial Instruments (as amended by No. 133)
SFAS No. 115	Accounting for Certain Investments in Debt and Equity Securities (as amended by No. 133)

SFAS No. 119	Disclosure about Financial Instruments and Fair Value of Financial Instruments (superseded)
SFAS No. 133	Accounting for Derivative Instruments and Hedging Activities (supersedes SFAS Nos. 52, 80, 105, and 119)
SFAS No. l37	Accounting for Derivative Instruments and Hedging Activities – Deferral of the Effective Date of FASB Statement No. 133 (amends SFAS No. 133 with regard to effective date)
SFAS No. 138	Accounting for Certain Derivative Instruments and Certain Hedging Activities (amends certain paragraphs of No. 133)

Emerging Issues Task Force (EITF)

No. 89-4	Accounting for a Purchased Investment in a Collateralized Mortgage Obligation Instrument or in a Mortgage-Backed Interest Only Certificate

FFIEC

Supervisory Policy Statement on Investment Securities and End-User Derivative Activities – 63 FR 20191 (April 23, 1998)

Joint Release: Interim Regulatory Reporting and Capital Guidance on SFAS 133, Accounting for Derivative Instruments and Hedging Activities (December 29, 1998)

Office of Thrift Supervision Bulletins

TB 13a	Management of Interest Rate Risk, Investment Securities, and Derivative Activities
TB 13a-2	Structured Advances

Derivative Instruments and Hedging Program

Examination Objectives

Determine if the board of directors has adopted a comprehensive hedging policy.

Determine if the association's policies adequately detail the various strategies involving derivatives and hedging.

Determine if the board of directors designates individuals responsible for transactions and specifies appropriate limits of authority.

Determine if management has the expertise to execute the program in conformance with the association's policies.

Determine if the use of derivatives and hedging activity is reasonable based on the association's operations, liquidity position, asset/liability structure, and capital position.

Determine if management and the board of directors adequately monitor the use of derivatives and hedging activity.

Determine if the association complies with regulations, maintains adequate documentation, and accounts for transactions properly.

Determine if there is risk from excessive hedging positions or low correlation between the hedged items and the hedging positions.

Determine if any of the hedging activity is speculative.

Examination Procedures

Level I

Wkp. Ref.

1. Review scoping materials applicable to derivative instruments and hedging. Some scoping materials include: the regulatory profile, previous examination report(s), correspondence, agreements, audit report, management letter, applicable work papers from previous examinations, management discussions from previous examinations, notes on interim monitoring, and agreements with investment consultants or brokers.

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2. Review the previous report of examination and all derivative instruments and hedging-related exceptions noted and determine if management has taken appropriate corrective action.

3. Obtain the association's policies and procedures relating to derivatives use and hedging. Determine if the policies and procedures contain the following information:

   - A description of the intended strategies.
   - A list of individuals responsible for executing the transactions for each derivative instrument and established limits of their authority.
   - Maximum amount of outstanding position by type (position limits).
   - Adequate detail of the rationale for determining the hedge ratios.
   - Description of the methods used to monitor the activity.

4. Review the board minutes to determine that the board of directors receives monthly reports on the association's use of derivatives and hedging activity. Determine if the reports are adequate for decision-making and allow the board of directors to monitor compliance with established guidelines. Board reports should contain the following information:

   - Positions established and offset (volume) by type during the month and realized gains or losses on these positions.
   - Open positions at the reporting date and the unrealized gains or losses.

5. Determine if management has the expertise to use derivatives and execute a hedge program in accordance with the objectives in the policies and procedures.

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6. Review the association's IRR Exposure Report to determine if it is using derivatives and hedging activity to lower its interest rate risk.

7. Summarize findings. Identify areas of concern and management's responses. Update the CEF, if applicable, with any information that will facilitate future examinations. File any exception sheets in the general file.

8. Review Level II procedures and perform those necessary to test, support, and present conclusions.

Level II

9. Obtain a listing of each of the general and subsidiary ledger accounts for each derivative instrument. Perform the following procedures:

   - Review a history of the significant transactions for each account to determine the purpose of the transaction and whether it was effective.
   - Compare the actual activity reported on brokers' statements, contract registers, and reports to the board of directors, with the general and subsidiary ledgers.
   - Determine if the association concealed any losses in an account recorded as an asset.
   - Determine the method of accounting used. For instance, deferral, lower of cost or market, marked to market, and determine if it is appropriate.

10. Review interest rate swaps and determine the following:

    - Whether the spread between the fixed rate and variable rate is reasonable and the matched asset has a positive spread taking into account the net cost of the swap.

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- The amount of the collateral requirements for the interest rate swaps and the location of the collateral.

11. Assess the overall effectiveness of the hedging program by identifying, analyzing, and determining the following:

    - The assets or liabilities hedged, including dollar amount, maturity, and interest rate.
    - The specific intent of each transaction. For example, was the intent to shorten the term of the asset or extend the term of the liability? Ascertain if each transaction reduced the association's interest rate risk.
    - The method used to derive the hedge ratios and if these ratios are reasonable.
    - The change in value of the hedged asset or liability during the hedge period by comparing the change in the interest rates of the liabilities or market values of the assets during the hedged period.
    - The change in value of the hedged item compared with the gain or loss from the hedging contracts.
    - The effectiveness between the hedging instrument and the matched asset or liability, by comparing the gains or losses from the hedging instrument with the increase or decrease in value of the asset or liability hedged.
    - The effect of the hedge on the overall operation of the thrift.
    - The opportunity cost (gain) of variation margin deposits if significant.

12. Prepare report comments. Identify transactions or matters that raise safety and soundness concerns. Provide the following information:

    - A summary of overall finding.
    - A description of deficiencies.

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- Management's proposed corrective actions.

13. Ensure that your review meets the Objectives of this Handbook Section. State your findings and conclusions, and appropriate recommendations for any necessary corrective measures, on the appropriate work papers and report pages.

Level III

14. Contact the regional capital markets specialist or other designated individual(s) for consultation on reviewing any of the hedging strategies. Assistance could involve the following items:

    - Expanding the scope of review based on the amount of activity.
    - Determining the reasonableness of hedging strategies.
    - Selecting specific transactions for financial modeling.
    - Participation in management discussions that could involve the thrift's consultants or broker/dealers.
    - Structuring comments for the report of examination.

15. Contact the regional accountant or the accounting policy division at OTS Washington to discuss the association's accounting for any of the hedging transaction.

16. Determine if the association has stock that is publicly traded. If so, review the reports filed with the Securities and Exchange Commission, including the 10K (annual) and the 10Q (quarterly) for any mention of derivatives use or hedging activity. Descriptions of activity should be consistent with actual transactions.

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17. Determine the creditworthiness of the counterparties if there is reason for concern about the counterparties' financial strength.

18. If the association conducts a high level of futures and options trading, review auditors' work papers to determine that they performed an appropriate level of verification of outstanding contracts with various brokers.

19. If the association conducts active trading, determine the following through observations and discussions with management and other personnel:

    - Is there a significant amount of activity with positions open for very short periods?
    - Does the association ensure that the trading and accounting functions are segregated?

Examiner's Summary, Recommendations, and Comments

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Prepared By: _____
Reviewed By: _____
Docket #: _____