Hedging with Derivatives Part I

By Graham Breakwell

In this article, Part I of a two-part series, my intention is to share a miniature guidebook on how derivatives hedging programs work to the benefit of a credit union. Specifically, I hope to address how an interest-rate swap (IRS) hedges the balance sheet and how to measure whether this type of derivative continues to perform as expected during its lifetime.

In "Hedging with Derivatives—Part II," slated for the Summer 2003 edition of InsideRisk, I will outline the accounting policies, along with the various board, regulatory and legal steps that you will need to take prior to executing a hedge.

Let's first discuss the kind of challenges you could face on your balance sheet that would suggest the use of an IRS. In general terms, your board, management and/or asset liability committee might be confronted with a level of interest-rate risk that exceeds the board's tolerance, as measured by established risk limits. We generally measure the level of interest-rate risk numerically based on projected changes in the current or future market value of the balance sheet or changes in projected net-interest income over a pre-determined timeframe. It is critical for all credit unions to have a thorough understanding of how to measure interest-rate risk and to have an analysis performed on a regular basis. Of course, the complexity and frequency of this analysis will vary based on the size of credit union and the complexity of its balance sheet.

Measuring interest-rate risk has been discussed at many WesCorp conferences and seminars. A review of past issues of *InsideRisk* will also offer extensive discussion of this subject. While no individual measurement provides the complete picture, the most comprehensive measurement of the long-term interest-rate risk embedded in a credit union's balance sheet is the potential volatility in net equity value (NEV). To provide useable information, the model that creates this information needs to have several characteristics. It must 1) allow for prepayment and extension risk of assets, 2) employ the implied interest-rate futures curve as basis for analysis, and 3) be flexible enough to handle a wide range of potential interest-rate scenarios. In other words, the model you employ to measure interest-rate risk at your credit union must accurately capture the "real world" characteristics of the major components of your balance sheet. Many assets and liabilities contain embedded options that are beyond the direct control of the credit union and will impact their performance in the future. This optionality must be fully captured.

Today, credit union regulators are becoming more focused on the measurement of NEV and its volatility. While income analysis and the primary capital account remain important to us all, be prepared to see more regulatory interest in the measurement of your NEV and its volatility under various interest-rate assumptions. Once you have a durable NEV-modeling process in place, you will need to set limits on the amount of NEV that your credit union is willing to accept under certain pre-defined interest-rate conditions. Examples could include shocking your balance sheet for immediate or gradual changes in interest-rates, from overnight out to thirty-years, of up and down one, two, three or even four percent. Under each scenario you might also want to establish a minimum level of NEV.

As an example, let us assume an immediate interest-rate shock upwards of three percent. Let's also consider that an NEV reduction of 35 percent is the maximum acceptable level of NEV volatility. The level of acceptable NEV volatility will vary according to each credit union. Some of the factors that must be taken into account are the current size of NEV, total assets on the balance sheet, and other risk factors such as potential credit losses. If a credit union has a high NEV ratio in the base case, they may be more willing to accept a larger proportional loss in NEV when interest rates change.

During the modeling process it is valuable to identify the specific assets and liabilities that contribute the most to NEV volatility. Generally these items will include long-term, fixed interest-rate assets, such as residential mortgage loans, and highly rate sensitive liabilities, such as money market accounts. If the current interest-rate exposure is unacceptably high or is restricting lending opportunities, then developing a hedge strategy may be a suitable course of action.

The first step in developing a hedge program is to select the appropriate size of the IRS hedge and the specific assets or liabilities that need to be hedged (i.e. converted from fixed interest-rate assets into floating interest-rate assets). Hedge accounting under FASB 133 is much cleaner for hedges are attached to floating-rate liabilities. Hedges that synthetically fix the cost of floating-rate liabilities for an extended term are eligible for "cashflow" hedge accounting where most of the fluctuation in market value of the hedge flows through other comprehensive income, (a component of equity), rather than current income. Hedges established against fixed-rate assets must utilize "fair value" hedge accounting where everything flows through the income statement. In both hedge treatments, any "ineffectiveness" in the hedge will have to be included in current income.

For purposes of brevity, I will not discuss the interest-rate cap (see *Definitions*) at this time. A cap is another type of hedge and will be the subject of a future article comparing the relative pricing and merits of IRSs and Caps. However, most credit unions considering a derivative hedging program are focusing on liability extensions utilizing IRS since they are more likely to be reasonably effective. Caps are presently very expensive due to the current extreme uncertainty over the direction of interest rates.

When structuring a hedge program, WesCorp and the credit union would jointly conduct an analysis of the assets that create the most volatility to NEV under different interest-rate scenarios along with the pricing mechanisms and procedures for administered accounts and certificates. It is important that the pricing of the hedged liabilities closely match the floating leg of the IRS under a wide range of interest scenarios. In determining the appropriate size of the hedge, we must consider the asset side of the balance sheet. Assets that include prepayment risk and extension risk will require thoughtful forecasts to determine how much is expected to remain outstanding under different interest-rate conditions. This is the tricky part of the analysis since recent history suggests that the forecast is fraught with uncertainty. If the assets payoff early in a declining rate environment, we might be left holding expensive liabilities.

The maturities selected for the IRS hedges will likely reflect the expected lives of the most volatile assets. In the case of a portfolio of fifteen and thirty year, fixed-rate mortgages, a combination of three-, five- and seven-year maturities might be suitable.

From an economic point of view, the credit union might be indifferent as to whether the hedge converts fixed interest-rate assets into floating interest-rate assets, or a floating interest-rate liability into a fixed interest-rate liability. However, as mentioned previously, your accountants will find the bookkeeping process for liability hedges to be much more simple and hold less risk of unwanted volatility in period-to-period earnings reports.

Defining the appropriate floating-rate leg for the IRS is critical. Typically, WesCorp will work with the credit union to select a particular liability account. Once the pricing methodology for the account has been described, a correlation test can be conducted to see how the pricing history of the liability has matched the floating interest-rate leg of the IRS.

For example, a money market account is re-priced based on the one-month T-Bill rate every first business day of each calendar month. By selecting a one-month Treasury bill index for the floating-rate leg of the IRS that is set on the same date, a close correlation can be found. This close correlation is good since it illustrates that the IRS is effectively converting the floating-rate liability into a fixed interest-rate liability. In practice, pricing decisions are much more complex and also subject to local competitive pressures. FASB 133 does permit the underlying index to be separated from the variable

"marketing" premium when measuring hedge effectiveness. This allows the credit union some room to react to their local competition and liquidity requirements.

So far, we have discussed 1) the steps of setting volatility limits for NEV, 2) interest-rate shocking of the balance sheet, 3) identifying the items on the balance sheet that contribute the most to NEV volatility, 4) identifying the items that are to be hedged (usually long-term, fixed interest-rate assets), 5) measuring the principal amounts and maturities required for the IRS, 6) selecting those liabilities to which the IRS is attached, and 7) how to re-price the floating interest-rate leg of the IRS. The next step is to actually select the IRS that best fits the balance sheet's NEV volatility.

Let's imagine a $250 million total asset credit union with an NEV of $25 million. This credit union has an NEV-to-total assets ratio of 10 percent. When the credit union's balance sheet is shocked by an increase in interest rates of three percent, its NEV falls to $17.5 million—a drop of $7.5 million and a decline to an NEV ratio to total assets of seven percent. The credit union finds this potential reduction in NEV unacceptable because it compromises the credit union's volatility limits ratified by the board at an earlier meeting. Let us now assume that a decline of $5 million in NEV is acceptable, which produces an NEV-to-total assets ratio of eight percent. In this scenario, it is a fairly simple task to select an IRS that will increase in value by $2.5 million in the immediate three percent upwards rate shock environment.

As with short and long duration bonds, the change in value of IRSs is directly related to their maturities. To select an IRS to improve in value in its Mark-to-Market (see *Definitions*) by $2.5 million, we would work backwards from maturity to notional principal or vice versa. Under today's current market conditions of five-year U.S. Treasuries at 3.12 percent and ten-year U.S. Treasuries at 4.14 percent, the following IRSs would indicate both a positive Mark-to-Market of approximately $2.5 million under an immediate upward interest-rate shock of three percent:

- A five-year IRS of approx. $19.8 million,
- A ten-year IRS of approx. $11.9 million.

The calculation of the Mark-to-Market is simple and may be created in a spreadsheet or on an "HP 12C" or any other calculator with the net present value function. WesCorp has some simple to use spreadsheet models that can be obtained from your investment services consultant. Clearly the maturities need to be selected according to the assets to be hedged, and the floating interest-rate index of the IRS has to be selected according to the correlation with the liability's interest-rate reset frequency.

Another aspect of the selection of IRSs that we must carefully consider is the impact to the Income Statement. This is what we frequently describe as the "immediate cost" of the hedge. Look at the five-year example of the IRS in the preceding paragraph. If the current floating interest rate (one month Treasury Bill) is 1.19 percent (the credit union receives this rate for the next month), and the five-year fixed interest rate is 3.12 percent (the credit union pays this rate), then the net negative cash flow for the next month on the IRS is 1.93 percent on a notional principal of $19.8 million. The implied yield curve indicates that while there is a negative cash flow in the immediate future, there will be an offset by positive cash flows later on. However, my article addresses ways to reduce the interest-rate risk in a credit union's balance sheet, not to examine whether the implied yield curve is an effective forecast of future interest rates.

Now that the details of the proposed IRS have been selected, they are included in the balance sheet modeling and the process of ascertaining volatility of NEV is conducted. If the credit union approves of the proposed reduction in NEV volatility, and if the reduction meets the volatility limits prescribed in the board minutes, it's now possible for the credit union to begin entering into the IRS with WesCorp. As with traditional investment portfolio management, we adopt the "average in method," where it is understood that balance sheets will continue to evolve and that adjustments will be made to the portfolio of hedges. As the balance sheet is interest-rate shocked every quarter, the credit union can

now compare the new volatility results with the original targets and the volatility limits that can change over time. The balance sheet is dynamic and its risks will be measured regularly. Since loans prepay earlier and extend longer than expected, liability pricing and outstandings change, different classes of assets are added, the remaining maturity of the IRS that was executed will decline and so forth. Given all these factors, it is highly probable that the IRS portfolio will have more additions over time in accordance with the evolving risk in the balance sheet.

I hope this discussion has answered many of your questions on the mechanical aspects of reducing interest rate in your credit union's balance sheet. However, if you need more information, please contact John Lau, our Derivatives Hedging Manager, for more information, (800) 442-4366, extension 6302, or e-mail: jlau@wescorp.org. Board, regulatory, legal, and accounting aspects will be discussed in Part II, as will the economic effectiveness of swaps and interest-rate caps.

Definitions

Cap—The ceiling on the price level of an underlying security constructed from a strip of European options. For example, if on prescribed reference dates, a standard interest rate such as LIBOR or U.S. Treasury Bills is above a rate agreed upon between the seller of the cap and the buyer, the seller pays the buyer the extra interest costs until the next reference date.

Duration—The rate of change of a bond's price for a given change in yield, usually expressed as one hundred basis points.

Interest-Rate Swap (IRS)—A swap where the cash flows exchanged are based on two different ways of calculating interest. The most common type of IRS involves the exchange of a fixed-coupon cash flow for a variable-coupon cash flow.

Mark-to-Market—The process of adjusting a security's price to fair market value each period. This process results in unrealized gains when the market price increases above historical cost, or unrealized losses when the market price falls below historical cost. Essentially, this process values a position, security or portfolio at current market prices.

Notional Principal—A basis for exchange of cash flows used in derivatives markets—the dollar amount of cash flows to be exchanged by multiplying an index or price factor by a notional principal balance, but the principal is not exchanged.

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