Comment Letter on Proposed Interagency Guidance – Interest Rate Risk

Joseph L. Breeden, Ph.D.
Chief Executive Officer
Strategic Analytics

Bob Teachworth
President
Denali Alaskan Federal Credit Union

The NCUA's Proposed Guidance on Interest Rate Risk addresses a very important topic that has been highlighted by recent events. In general terms, we know that changes in interest rates can dramatically affect the financial stability of a credit union, or in fact any lender. The letter addresses the question of (1) what statistical approaches and data assets are required to assess interest rate risks to earnings, (2) what data resources are required to create usable estimates, and (3) the potential need for credit unions to collaborate in the areas of data, models, and validation in order to effectively comply with these guidelines and improve their financial stability.

1. Modeling Perspective by J. Breeden

The stresses of the US mortgage crisis, nationwide house price collapse, and severe recession highlighted the need for improved risk management by credit unions. The proposed guidance appropriately asks credit unions to improve their risk management. The guidance states clearly that risk management policies must be based upon estimates of the sensitivity of the institution's earnings to changes in interest rates with particular focus on long term products such as mortgages. Clearly, any adjustable-rate product will also show sensitivity.

The guidance recognizes that small institutions will not have the resources to comply, and that the effort invested should be proportional to the size and complexity of the institution. The challenge, as was made obvious in the recent crisis, is that many models in common use cannot be trusted for this task and can actually exacerbate the problem. The following sections will discuss the minimum that is required to create real improvements in risk management at credit unions.

1.1 Modeling requirements

In assessing an institution's earnings sensitivity to changes in interest rates, we need to break the problem into modelable pieces. The following list includes a few of the items that experience clear impacts.

- Interest income
- Prepayment rate on term loans
- Default rate on all loans
- Credit risk of new originations

1.1.1. Interest Income

Interest income is the most obvious. Changes in interest spreads between lending and deposit rates either through changes in overall interest rates or via competitive pressures clearly impact the lender's balance sheet. These risks are easy to estimate given a model for future receivables. For term loans, future outstanding balances are straight-forward to estimate, but balances in deposit accounts and lines of credit will both respond to changes in the offered interest rate.

Effectively modeling future outstanding balances for any retail product requires knowledge of the typical balance growth or pay-down lifecycle. This product lifecycle is specific to the product and consumer segment being modeled and is a function of the age of account. Such lifecycles appear in almost any variable being modeled in retail lending and are well known to experienced analysts.

In addition to the expected lifecycle, we would need to capture changes to the usual balance growth as the assessed interest rate changes. When rates rise on an adjustable rate, line-of-credit product, members can be expected to charge less or even pay-down their outstanding debt. For fixed rate products, declining interest rates can bring loan prepayment as discussed in the next section.

Several methods exist for computing them. Dual-time Dynamics, Survival Models, Proportional Hazards Models, Age Period Cohort Models, and Panel Data Methods can all be employed to effectively capture these effects. As a group, we refer to these as Nonlinear Decomposition methods. (See (Breeden J. L., 2010) for a detailed description of these methods.) Although well-proven in retail lending over the last decade, these methods require real modeling expertise, either the account or vintage[1] level data, and specific consideration of the age of the account.

Conversely, we know from experience that directly modeling time series of outstanding balances is insufficient. Without knowledge of the product lifecycles, sensitivity to interest rate moves cannot be reliably identified.

1.1.2. Prepayment Rate

Another well-known effect is the impact of interest rates on the early pay-off or pay-down of loans. This effect is well studied, and a number of vendors provide models for this, particularly for mortgage products. Similar to the modeling of outstanding balances, prepayment modeling needs to capture the standard lifecycle for the prepayment of fixed term loans as well as impacts due to refinancing when interest rates fall or early pay-down when interest rates rise.

To create these models in-house, a credit union will need to employ one of the nonlinear decomposition methods described above, and the data needs are the same.

[1] A vintage, or static pool, is a group of loans booked in a fixed time period. Monthly, quarterly, and annual vintages are common. Vintages are used as a tracking and modeling mechanism to measure the extent to which bookings in one time period differ from those in another time period.

1.1.3. Default Rates

When assessing interest rate risk to earnings, some people may think primarily of the direct risk to revenue, but default risk is an equally important effect for many loan products. With any adjustable rate product, an increase in the interest rate charged to consumers will push some of those consumers into default. This effect has been very clearly observed in products like 2/28 ARMs, where borrowers who purchased a mortgage with a low initial interest rate went into default when the interest rate reset to market rates after two years. These rate resets can bring significant losses in mortgage and home equity loans. For credit cards and lines of credits, the risk is also present under significant swings in interest rates.

Modeling the default rate sensitivity to interest rate resets again cannot be done in any useful way unless we first know the expected default rate through the product lifecycle and for groups with different intrinsic credit risk. As observed in the previous sections, the only models that successfully predicted default rates through the mortgage crisis were nonlinear decomposition methods. One of those methods will be required to model rate resets.

1.1.4. Credit Risk for New Originations

The previous three items are the most obvious direct impacts of interest rate changes. Although the modeling may be more difficult than many assume, the concepts are well known.

However, through the US mortgage crisis, one of the greatest impacts of changes in interest rates appears to be the shift caused in consumer appetite for new debt. Just as we talk about lenders setting their risk appetite, consumers also manage their risk appetite intuitively, often with no explicit recognition of the process. Research by the Philadelphia Federal Research (Calem, Cannon, & Nakamura, 2011) and Strategic Analytics in cooperation with the University of Southampton[(Breeden, Thomas, & McDonald III, 2008) and (Breeden J. L., 2010)] has shown that the credit risk of new loans goes through extreme shifts with changes in interest rates. This effect is called Macroeconomic Adverse Selection.

In short, when the offered interest rate for a new loan is significantly lower than the rates of previous years, naturally conservative consumers rush to the market to take on additional cheap debt to finance purchases of new homes, cars, and other desires. Conversely, when interest rates have been flat or rising over recent years, only the risk-taking consumers remain.

This separation between conservative and risk-taking consumers is not reflected in credit scores or any of the usual loan application information. Two consumers may have had the same past spending and payment behavior (and therefore the same credit scores), but when interest rates are rising the lender should ask, "Why would you want a loan now?"

The reality of macroeconomic adverse selection simply means that credit scores are not sufficient to assess applicant risk through interest rate cycles. Instead, to complete the capturing of interest rate risk, we must have an early warning system for assessing the performance of recent originations while normalizing for the age of those loans and the current economic environment. As with the other items, this again is captured naturally by the nonlinear decomposition methods. Conversely, one needs to be

aware that the moving-average roll rate models and score-to-odds calibration models prevalent in the industry failed to capture the macroeconomic adverse selection effect and therefore failed badly through the US mortgage crisis.

1.1.5. Modeling Summary

The point of this modeling discussion is not to advertise for a specific set of models. Rather, it is to illustrate that the nonlinear decomposition models are the only class that has been successfully applied to the interest rate risk problems described herein. Although everyone would like to allow a sliding scale of model complexity matched to credit union size and complexity, there is a minimum acceptable model class that can actually improve institutional soundness. Lesser models have proven not just to be inaccurate, but misleading as we enter and exit major economic crises. Implementation and reliance on an ineffective model can be more dangerous than having no model at all.

The most obvious solution to the need to create sophisticated models is to allow credit unions to pool resources. Rather than expecting even the larger credit unions to independently create analyst teams to create the models necessary, the Credit Union Service Organization (CUSO) structure seems ideally suited to allowing credit unions of all sizes to pool resources to create common models. Risk management is a natural venue for credit unions to cooperate rather than compete. Better risk assessment and management tools across the industry helps support responsible lending and avoid the rush-to-the-bottom that was so prevalent in the mortgage crisis.

1.2. Data requirements

Data availability will be a significant obstacle to meeting the requirements of the IRR guidelines. Even simpler models would be data-hungry, because we need to look across interest rate and economic cycles to assess sensitivity. This is the opposite of the way credit scores are typically built, when only the most recent couple of years are emphasized. With any model that captures macroeconomic drivers such as interest rates, even data for one full economic cycle is barely acceptable.

Furthermore, only the largest credit unions will have sufficient data to model the various product types with sufficient accuracy to cover the portfolio. Clearly to meet the requirements of the proposed guidance product features like term and rate reset structure must be considered. At that level of granularity, all but the very largest credit unions will need external data sources to augment their modeling.

Credit unions do have the option to purchase historical data from sources such as the credit bureaus. This can be potentially costly, so it again seems logical that credit unions may want to pool their data, possibly via a CUSO structure, to create models sufficiently detailed to be useful in risk management. We would hope that implementation of this guidance would support and even encourage this kind of collaboration among credit unions.

1.3. Validation

Validation and explanation are critically important parts of any policy that depends on models. The proposed guidance makes it clear that credit unions must be able to explain both the approach and

results coming from their IRR models. We certainly agree that the credit union's management must be able to understand and explain the framework being employed so that they can effectively incorporate it in their plans. Further, management must be able to explain the results.

One assumes that along with explanation comes validation. Whoever builds the model must be expected to prove that it is reliable to an independent reviewer. Just as very few credit unions currently have the expertise to build the required models, the same level of expertise will be required to validate those models. Consequently, this appears to be another area where collaboration should be encouraged. If credit unions use a collaborative solution, such as that from a CUSO, the CUSO should be expected to provide appropriate explanation and validation of those methods back to the credit unions. For the detailed technical discussion, particularly around validation, the NCUA could directly interact with the CUSO to assure efficacy rather than expecting the same level of expertise at each participating credit union.

1.4. Summary

Overall, we believe that the goals of the proposed guidance on interest rate risk are worthy. The intent of this letter is to highlight the minimum level of effort in modeling, data, and validation required for an approach that is effective and beneficial, rather than purely something that passes review. The US mortgage crisis provides clear support for this position as we observed how insufficient models not only failed to predict, but also misled management and encouraged mismanagement of risk.

The solution to all these challenges appears to be well within the grasp of the credit unions, if they work collaboratively. We hope that the final guidance will recognize the benefit that can come from collaboration, not just in controlling costs, but more in creating solutions that are useful in actively managing risk.

2. Management Perspective by B. Teachworth

As Dr. Breeden indicates, interest rate risk is only one component of a global risk management program within a credit union as interest rate movement influences consumer behavior on many levels - from prepayment speeds to purchasing decisions and in some cases default risk.

However, as part of that global risk management program, a credit union should have a written policy that provides guidance and allows them to ascertain the effect on net income and capital posed by a variety of interest rate scenarios. The complexity of that policy should be based on the nature of the product and services offering of the credit union. In addition, because balance sheets can carry a variety of risks, the policy should reflect the inherent risk of the credit union’s own, unique portfolio. The methods and models used discern the level of interest rate risk in the portfolio must be reasonable and prudent while addressing the rate movement both in terms of timing, scale and probability.

The current method of stress testing utilized in credit unions involves “shocking” the balance sheet by an immediate and continued increase or decrease of market interest rates, three-hundred to five-hundred basis points. The goal is to measure the impact of rate movement on income and net-worth.

There are two issues with this method. The first issue concerns the parallel approach to rate movements as compared to the proportional approach. The second issue involves the probability of the occurrences of these scenarios. A parallel rate shift is considered very simplistic and is often viewed as a worst case scenario. Asset/Liability Management software vendor Profitstars, provides this definition:

> The parallel approach assumes that all rates in your portfolio move in a parallel pattern. That is, for every 1% rise in a loan or investment account, there will be a corresponding 1% rise in a deposit account. There are two major problems with this approach. First, a 1% rise in rates on the asset side of the balance sheet will rarely result in a proportionate rate shift on the liability side. The other concern is the timing. When rates rise on the asset accounts there is typically, particularly for transaction accounts, a lag in the change of rates on liability accounts. Therefore, the parallel approach is generally not the best approach to use when applying rate shocks to your portfolio. This however, is the approach used by some examination teams.
>
> A "proportional" approach to rate shocks moves rates in proportion to a single driver rate. National Prime is commonly used as a driver rate. The rate of a deposit moves in proportion to the driver rate. An example would be where Prime moves 100 basis points and the pricing of an asset might move only 50 basis points, where a liability moves only 25 basis points. The proportional approach is more realistic, but in some cases may slightly over estimate the interest to be earned on assets. (Profitstar v4.4)

The second issue with the current method instantaneous rate shocks involves probabilities. The interest rate sensitivity of credit unions, and most financial institutions, are heavily weighted toward liabilities. Overly conservative interest rate risk mitigation and management leads to lost revenue and more costs. There must be sufficient revenue to support asset growth as well as maintain or grow the net worth ratio.

Certainly, Congress and Regulators must be in favor of modeling systems that can balance the cost of mitigating balance sheet risk against the need to grow current earnings and capital. Forcing institutions into balance sheet transactions that mitigate interest rate risk, without some consideration for probability of particular scenarios, will result in lower current earnings and lower immediate measures of Net Capital. Could better systems preclude the need for these costs when appropriate and, alternatively, trigger tougher decisions in times when loan portfolio credit defaults are imminent?

Accordingly, in addition to the proportional rate adjustments, scenario modeling should involve the use of periodic stochastic probability analysis with the aim to manage the risk within acceptable tolerances. Furthermore, a system that aggregates interest rate risk with credit default risk would move the industry towards a solution of carefully measured risk and related optimal portfolio balance.

The Federal Government through the Federal Reserve strongly influences the incremental change in interest rates as well as the speed at which they move. Therefore, it is incumbent on financial institution regulators to monitor the global impact and report to the Federal Reserve the projected effects of rapid and significant interest rate movements on the nation's financial institutions.

Finally, in this era of increasing interest rate and credit default risk, examiner training should allow for the traditional methods as well as new methods that are ultimately advancing the industry to better risk modeling solutions, and protecting the share insurance fund.

3. Bibliography

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