

4711 Yonge Street
Suite 700
Toronto ON M2N 6K8
Telephone: 416-325-9444
Toll Free 1-800-268-6653
Fax: 416-325-9722

4711, rue Yonge
Bureau 700
Toronto (Ontario) M2N 6K8
Téléphone : 416 325-9444
Sans frais : 1 800 268-6653
Télécopieur : 416 325-9722



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Guidance Note:

Structural (Interest Rate) Risk Measurement and Management

DICO By-Law #5: Sound Business and Financial Practices

This guidance note is for use by complex credit unions and outlines alternative techniques and criteria that the Board and management should consider in managing Interest Rate Risk (IRR).

This guidance note also provides the technique and criteria to be used by complex credit unions for measuring IRR for the purpose of calculating risk weighted capital under the revised Capital Regulations, effective October 1, 2009.

DICO considers a complex credit union to have the following characteristics:

1. The total assets of the credit union as set out in the audited financial statements of the credit union that were placed before its members at the most recent annual meeting are greater than or equal to \$50 million; or
2. The credit union participates in commercial lending.

If either of the above two conditions exists, DICO will consider the credit union to be a “complex” credit union and subject to the guidance expectations for a complex credit union.

The Board of directors of a credit union is required to establish and implement prudent policies with respect to the measurement and management of interest rate risk (IRR) and ensure that management takes the necessary steps to monitor and control those risks.

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Introduction

In July 2004, the Basel Committee on Banking Supervision released a document titled “Principles for the Management and Supervision of Interest Rate Risk”. The document was drafted following consultation with regulatory authorities of member countries, members of the banking industry and others that provided their guidance on developing these principles. The report outlines 15 principles for Boards, Management and Supervisors with respect to structural interest rate risk.

The main points respecting the supervision of IRR are as follows:

- Institutions must have interest rate measurement systems that capture all material sources of interest rate risk;
- Institutions must measure IRR as it affects earnings and the economic value of equity;
- Supervisory authorities must assess whether the internal measurement systems of financial institutions (FIs) adequately capture the risk. If not, then an institution must bring the system up to standard;
- Supervisors must set standardized testing conditions for IRR measurements; and
- Institutions decide on the extent of risk taking and Supervisory authorities determine if capital is commensurate with IRR. If not then additional capital may be required or risk taking reduced.

This approach differs fundamentally from the current set of Regulations, where risk taking is prescribed (“15 basis points of assets”) and the testing conditions are open (“reasonable expectation of changes in interest rates”). The new Regulations will allow credit unions to establish prudent limits with respect to interest rate risk levels.

In 2005, DICO commenced a program of conducting structural interest rate risk management reviews at large credit unions in Ontario. All of the structural risks were reviewed within the credit union and the credit unions were advised on areas requiring further development in the areas of earnings and equity at risk measures. Strong practices were identified and general guidelines were provided.

IRR Measurement System

There are four types of structural interest rate risk. As defined in the Basel paper, the four risks are repricing (mismatch), yield curve, basis and optionality.

- Repricing or mismatch risk is created when fixed rate loans are funded by variable rate borrowings or when fixed rate deposits fund variable rate loans. This type of risk generates the largest amount of earnings variations.
- Yield curve risk is the result of fixed rate loans being funded by fixed rate deposits of a different term. Yield curve risk usually does not affect earnings

variation because the terms are beyond the 12-month earnings period. Yield curve risk requires an equity-at-risk measure.

- Basis risk arises when variable rate loans are funded by variable rate deposits that change rates at different speeds. When variable rates move at different speeds, earnings variation rises.
- Finally, optionality risk is formed from options embedded in many products. Optionality risk changes the maturity or the payment profile of products. As such, optionality can impact both the earnings and equity measures.

Credit unions must identify their structural interest rate risks and develop statements (policies or strategies) around the management of these risks. By developing an understanding of how fixed and variable rate loans and deposits come in contact and generate structural risks, an appropriate understanding of the risks facing an organization should become apparent. For a credit union offering a standard package of modern retail products (variable and fixed rate mortgages, chequing and savings accounts, and term deposits) the need for a measurement of risk to equity and earnings is essential. An effective risk measurement system should:

- generate all cash flows for all products. Performing an analysis on data that accurately represents the actual risk allows for the determination of the correct risk to earnings and capital. The ability to generate correct cash flows for mortgages, and compounding or non-compounding deposits are essential. Being capable of generating these cash flows will result in the system being capable of further modifications to data that may be required;
- be able to modify cash flows for assumptions regarding unscheduled principal prepayments (UPP) and deposit redemption behaviour. Developing a justifiable assumption of UPP risk is critical for determining a realistic term structure for asset re-pricings, which can result in improved margin control; and
- Include the availability of modeling non-term balances. Assumptions relating to core balances should be reviewed annually for non-term balances (capital, chequing and savings accounts, variable rate loans). Term structures appropriate to their interest rate behaviour must be incorporated into the IRR measurements. Ignoring this practice or taking up very conservative assumptions will result in poor control of interest rate margins.

Measuring Interest Rate Risk

The Basel paper states that financial institutions should measure interest rate risk as it relates to earnings (earnings-at-risk, EaR) and as it relates to equity (economic value at risk, EVaR). The EaR test measures the impact that short term interest rates have on 12-month margin. The EaR test captures most of the mismatch and basis risk in the portfolio. The EVaR test measures the impact that longer term interest rates have on the equity of the financial institution. The EVaR test is affected by yield curve and optionality risk. To measure all structural risks properly, an earnings-at-risk test and an equity-at-risk test must be performed.

Earnings at Risk

The EaR test involves the usage of an income simulation model. The purpose of such a model is to simulate the 12-month income of the current mix of business taking into account market rates, growth rates of businesses, behaviours of depositors and competitive pricing conditions. By changing the inputs (rates, growth, pricing and composition) the 12-month margin simulation should vary. Changing the level of interest rate inputs represents an earnings-at-risk test. The following practices are recommended for generating an acceptable EaR test.

- The 12-month simulated income should align itself closely with budgeted interest margin;
- The income simulation model should detail simulated margin on a month by month basis and these forecasted balances should be reconciled against actual margin results to verify the accuracy of the model. This approach is known as back-testing the model;
- Inputs of growth, pricing and behaviour must be verified regularly by reviewing recent observed activity;
- Aside from measuring earnings sensitivity to interest rate changes, earnings sensitivity to growth rates, pricing conditions and composition of business should also be performed and considered;
- The base rate path to be used in the income simulation model should be the current yield curve as it represents the market's current expectation of the future path of interest rates¹;
- Using historical simulation is the most effective means of expressing the margin variation from interest rate risk. As stated earlier, using historical simulation can be a complex process and may not be a viable option in some cases. In instances such as these a parallel shock test of the yield curve will be considered effective. The shock test must be stressful to be effective. (Basel recommends a 2% shock for G-10 countries); and
- In the place of historical simulation (and in addition to historical simulation for those capable of performing the process) the credit union should undertake a stressful parallel rate shock test to the portfolio.

As indicated in the introduction, credit unions are required to establish prudent limits with respect to the level of interest rate risk undertaken.

¹ Although the current yield curve has been a historically poor predictor of the actual course of interest rates, less accurate over time than the yield curve have been the interest rate expectations of senior management. Notwithstanding its limitations, the yield curve is still the best predictor available. Many financial institutions today address this issue by using historical simulation. Historical simulation involves using the past behaviour of interest rates (volatility and correlations) to generate a series of potential rate paths from today's yields that generate a distribution of potential 12-month margins. Using historical simulation can be a complex undertaking; but it does provide an effective means of understanding the margin variation in the portfolio.

Credit unions should ensure the method for measuring earnings at risk is accurate and that they have a sufficient understanding of available income prior to establishing such limits. The following practices should also be considered when establishing prudent limits for EaR:

- On an annual basis, credit unions should determine what amount of net income before or after tax it wishes to risk on interest rate movements. This amount of income should be its EaR Board limit;
- Management may wish to set an EaR management limit below the Board limit to account for margin variation outside of interest rate effects – such as growth and pricing competition; and
- If during the year some extraordinary changes to forecasted net income occur, management should review its EaR limit.

Economic Value at Risk

Measuring EVaR involves the usage of a duration measure and a concept called Market Value of Equity or Duration of Capital. Modified duration is defined as being a measure of the change in the market value of an instrument for a change in yields.

Measuring the duration of loans and the duration of deposits will allow for the determination of the duration of capital. Using the duration of capital measure is a means of quantifying the amount of yield curve risk a credit union can take in the portfolio. Lending five years and borrowing two years has no impact on EaR. EVaR however is impacted by this activity and can quantify this risk-taking over all gaps beyond one year. Essentially, the EVaR measure takes all of the net, long-term, interest rate risk in the portfolio and expresses it onto capital. The following practices are recommended for generating an EVaR test:

- The risk management system used by a credit union must be able to accurately measure the duration of loans and deposits. The system must also be able to incorporate the Unscheduled Principal Payments (UPP) for mortgages into the calculation;
- The credit union should establish upper and lower limits for the duration of capital that are considered prudent;
- The limits should be based on documented analysis and reviewed annually;
- The term structure on non-term items such as chequing and savings accounts, as well as derivative positions should be included in the calculation of capital duration; and
- In addition to testing for parallel shifts of the yield curve (e.g. +/- 1%), it would be beneficial for credit unions to perform other tests on the portfolio such as curve steepening or flattening situations.

Other Considerations around Measuring IRR

Aside from measuring EaR and EVaR risk accurately and regularly (recommended at least monthly for most large credit unions), it is important to ensure that the decision-making process is focused on these measures. The process for undertaking decisions should not entail a long approval process, which could delay management's ability to respond to changing market conditions.

The responsibility of the Board is to approve strategies, set limits and receive reports that evidence that management is staying on those strategies and abiding by the limits. The Board's responsibility is not to become involved in the management interest rate risk.

Management should have a regular monthly meeting which reviews EaR and EVaR and all the relevant issues with these measures. Out of that meeting should come approval that the current EaR and EVaR are suitable. If not, potential actions to be taken should be noted.

IRR Risk Weighted Capital Requirements

As outlined in Regulation 237/09 subsection 18(11) and 18(12):

unless another amount is approved by the Superintendent, a credit union's applicable interest rate risk is the amount calculated using the formula,

$$J/0.08$$

where "J" is the amount of the credit union's capital charge for interest rate risk as determined using the formula,

$$K \times 0.15$$

where "K" is the amount of the credit union's exposure, determined in accordance with the techniques referred to in paragraph 2 of subsection 71(1).

Measuring IRR for the Purposes of Calculating Regulatory Capital

The Basel Committee outlines two standardized testing conditions for EaR and EVaR. It recommends that institutions should either perform a parallel shock test of 2% for G-10 countries or perform historical simulation to 99% level of confidence using a minimum of 5 years of historical data. Although it has set forth the principle of common testing standards for all G-10 countries, the Committee realizes that in practice, testing conditions will be set by each country and/or regulator based its own unique characteristics.

Applying testing conditions that are too conservative represents a tax on capital and a competitive disadvantage in some instances. Conversely, testing conditions that are too liberal may underestimate the potential risk.

Although EVaR measurements capture IRR during all time periods, a considerable amount of the risk identified may be of a longer-term nature (beyond 12 months), which is less likely to impact capital immediately. Given that management has more time and more strategic alternatives to manage longer-term structural interest rate risks, it is not proposed that EVaR is used for capital adequacy purposes, although EVaR measures must be used to ensure that credit unions have a comprehensive view of the potential long-term effects of changes in interest rates.

For the purposes of calculating risk weighted capital, credit unions are required to use EaR as outlined in this guidance note to measure IRR exposure.

Since the use of a shock test represents the largest common factor for an EaR test, the EaR test will employ a parallel shock upwards and downwards of the current yield curve. The shock should be stressful; but again be representative of a potential change in interest rates. It should be reviewed on an annual basis.

For the purposes of calculating risk weighted capital, credit unions are required to undertake a stressful parallel rate shock test to the portfolio for EaR. The strength of the shock test will be prescribed by the regulatory authority and will be based on prevailing market conditions.

Using historical simulation to measure margin variation is a more practical approach to IRR. Unfortunately, not all credit unions will be capable of using this approach. For those that use historical simulation, a level of confidence or certainty must be chosen. The Basel Committee has indicated that a 99% level is appropriate. This represents a very conservative level of certainty, and credit unions may work to a lower level of certainty. The amount of response time typically needed to identify a situation and the ability to control margins should be considered when determining an appropriate confidence level.

For the purposes of calculating risk weighted capital, the level of confidence for managing EaR or margin variation should be set no lower than 90% unless the credit union has ability to act swiftly to control margin.

For the purposes of calculating risk weighted capital, credit unions are required to use the negative impact on earnings for IRR exposure.