Chapter 13

ASSET LIABILITY MANAGEMENT (ALM)

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Chapter 13 – Part 1

ASSET LIABILITY MANAGEMENT (ALM)

Examination Objectives

- Determine safety and soundness of the credit union's Asset Liability Management (ALM) process
- Determine whether the credit union effectively manages its balance sheet
- Alert the officials to existing or potential weaknesses resulting from the ALM process

Associated Risks

- Interest rate risk (IRR) – the risk that changes in market rates will adversely affect a credit union's capital and earnings;
- Liquidity risk – the current and prospective risk to earnings or capital arising from a credit union's inability to meet its obligations when they come due;
- Strategic risk – the current and prospective risk to earnings or capital arising from adverse business decisions, improper implementation of decisions, or lack of responsiveness to industry changes; and
- Reputation risk – the risk that the credit union cannot meet member loan and share funding requests, causing concerns about the credit union's solvency.

Overview

ALM is the process of evaluating balance sheet risk (interest rate and liquidity risk) and making prudent decisions, which enables a credit union to remain financially viable as economic conditions change. A sound ALM process integrates strategic, profitability, and net worth planning with risk management. This process often includes an Asset Liability Committee (ALCO), which has the central purpose of attaining goals established by the short- and long-term strategic plans without taking on undue risk. While smaller credit unions with simple balance sheets may not have or need an ALCO, an ALCO represents a sound business practice for larger institutions with more product offerings (e.g., real estate loans.)

Credit unions with effective ALM programs can better balance the demands of meeting their members' needs with the objectives of maintaining financial strength and flexibility. Credit unions with sound ALM processes recognize that ALM involves more than just an IRR measurement program; they retain a global view of the purpose of ALM. For example, ALM management includes activities such as marketing, product pricing, investment analysis, cash management, internal controls, and data processing, all while understanding how external factors (e.g., laws, economic conditions, sponsor support) affect the credit union.

Overall, successful ALM programs encompass the following practices:

- Identifying goals and objectives;
- Developing strategies;
- Creating polices and procedures;
- Managing product offerings and pricing;
- Identifying, measuring, monitoring, and controlling exposures to risk;
- Generating adequate income and net worth over varying economic conditions; and
- Maintaining financial flexibility.

Credit union boards have responsibility for overseeing the ALM process, and usually delegate the day-to-day implementation to management. Since ALM affects the entire scope of a credit union's operation (e.g., types of loans, loan rate structure, investments, sources of funding, share rate structure, profit expectations, level of risk, etc.), an effective ALM program requires an integrated process of coordinating, analyzing, and communicating that includes all operational units.

In larger credit unions, key players or operating units involved in the ALM process generally include the chief executive officer (CEO) and the chief financial officer (CFO), as well as management in the areas of finance (investments), lending (credit), shares, and marketing. Smaller credit unions may integrate the ALM process within one or two key persons (e.g., CEO or CFO.)

The primary objective of examiners' ALM review involves analyzing the credit union's approach to ALM and assessing the level of balance sheet risk exposure. Therefore, the examiner should ensure management performs its due diligence by regularly analyzing the structure of its assets (loan and investment products, rates, terms, etc.) and liabilities (share products, rates, terms, etc.) to determine the credit union's potential risk exposure.

To ensure they maintain adequate net worth over a broad range of possible economic conditions, credit unions should have in place a process for (1) identifying, measuring, monitoring, and controlling balance sheet risk; (2) monitoring financial performance; and (3) actively managing (limiting) short- and long-term earnings fluctuations. The officials should understand the reasons for any balance sheet risk exposure. They should adjust the plan when necessary to maintain positive earnings and sufficient net worth. In this regard, ALM represents a decision-making tool for helping credit unions realize stable earnings and appropriate net worth levels over time as economic conditions change.

Sound, flexible ALM processes, which can respond to changing market conditions, enable credit unions to make more prudent decisions about their balance sheet growth and product mix. This also enables the credit union to better serve their members' needs without incurring excessive or unreasonable levels of risk.

While the term ALM can encompass the broad area of balance sheet risk, this chapter will focus on interest rate and liquidity risks because they represent the most prominent risks affecting credit unions. Part 2 of this chapter addresses Interest Rate Risk and Part 3, Liquidity Risk. Although this chapter separately addresses each of these risks, in reality, they interrelate with each other. That is, actions that will affect a credit union's IRR exposure will also likely influence the liquidity risk exposure to some degree, and vice versa.

Reference

- IRPS 98-02, dated 1998, *Supervisory Policy Statement on Securities Activities and End-User Derivative Activities*

Chapter 13 – Part 2

ALM – INTEREST RATE RISK

Examination Objectives

- Determine the credit union's exposure to interest rate risk (IRR)
- Evaluate how effectively management manages IRR exposure
- Communicate necessary concerns with management
- Develop agreements for corrective action, as necessary

Associated Risks

- Interest rate risk (IRR) – the risk that changes in market rates will adversely affect a credit union's capital and earnings;
- Strategic risk – the current and prospective risk to earnings or capital arising from adverse business decisions, improper implementation of decisions, or lack of responsiveness to industry changes; and
- Reputation risk – the risks that the credit union cannot meet member loan and share funding requests, causing concerns about the credit union's solvency.

Overview

IRR is the potential decline in earnings and net worth arising from changes in interest rates. This risk generally occurs because a credit union may have a disproportionate amount of fixed and variable rate instruments on either side of the balance sheet. Thus, as interest rates change, the earnings stream or dividend expense on variable rate balances will change while fixed rate balances will remain the same. Accordingly, net income may rise or fall depending on the direction of rate changes and whether the credit union is asset or liability sensitive.[1]

Credit unions with sound interest rate risk management processes can often avoid wide swings in net earnings (see Illustration 13-A.)

[1] Asset sensitive means that the credit union has more assets that will reprice than shares. Liability sensitive means that a credit union has more liabilities that will reprice than assets. Repricing can occur due to maturities or resetting variable instruments interest rates.

Illustration 13-A shows how the asset yield (interest income) of a credit union can decline over time in response to falling market interest rates. The graph depicts how this credit union adjusted its cost of shares (interest expense) and thereby maintained a relatively constant net interest income (NII) over time. Finally, the graph shows net operating expenses as relatively constant and net income positive over the period, with only a slight variance despite the falling market interest rates.

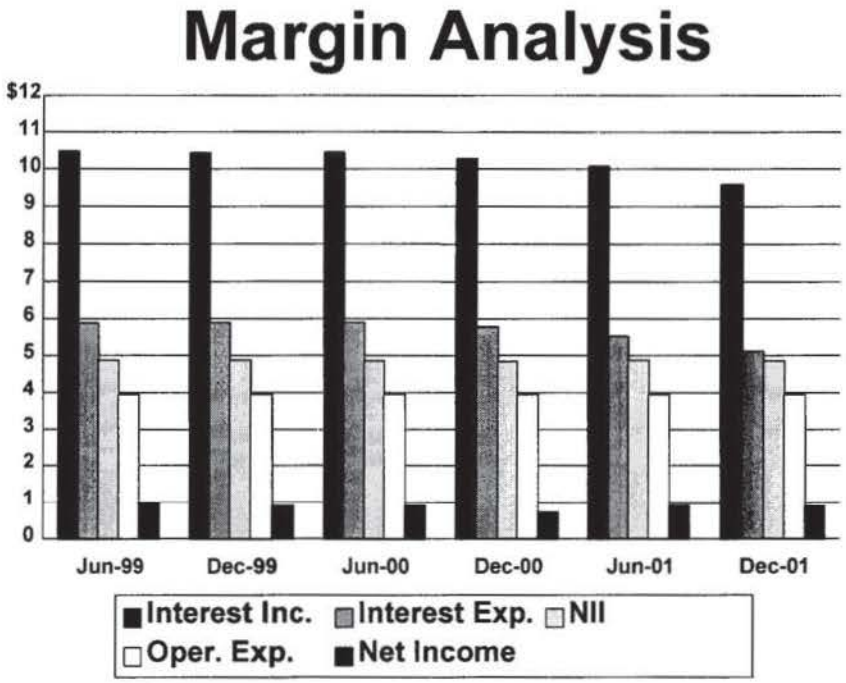

Illustration 13-A

Small and basic service credit unions may have fairly simple IRR processes. These may incorporate awareness of the members' share and loan needs, relatively simple short-term loans and investments, and flexible pricing policies that permit adjusting dividends and loan rates to changes in market interest rates, thus maintaining adequate earnings and net worth. In larger credit unions with more complicated balance sheets, particularly those with higher concentrations of long-term assets or more rate-sensitive deposits, the credit union needs a more sophisticated and comprehensive approach to IRR management. It also requires a more extensive review by the examiner.

IRR Examination Procedures

The depth of analysis and time needed to review a credit union's IRR management process varies from examination to examination. The types of tests and level of examiner scrutiny will depend on the complexity and size of a credit union's balance sheet, from "simple" to "complex."

Credit unions having a conservative, short-term structure of shares, loans, and investments may only need to demonstrate a basic understanding of IRR. Aside from repricing their share and loan products, simple credit unions generally pose lower IRR.

For larger credit unions or those with more complicated balance sheets, the examiner should expect a more comprehensive IRR management process. This should include a more sophisticated analysis prepared and provided to the board on a regular basis with measures of exposure to IRR.

The Interest Rate Risk Questionnaire (IRRQ) in AIRES is a flexible, yet comprehensive tool to help the examiner determine the scope of an IRR review. When examiners find little evidence of IRR, they can narrow and focus the scope on a general review of the risk management process. When a greater likelihood of IRR exists, examiners should expand the scope to review and analyze the risk management program in depth. Regardless of the credit union's approach to risk management, the examiner may use, as necessary, Parts A through D of the IRRQ to document the review of certain basic elements.

Complex Investments

As a first step, the examiner should determine whether the credit union has any loans secured by real estate or any complex investments. According to Part 703 of *NCUA Rules and Regulations,* complex investments have the following characteristics:

- Embedded options (e.g., calls, interest rate caps or floors, prepayments);
- Remaining maturities greater than 3 years; or
- Coupon formulas related to more than one index, or are inversely related to, or multiples of, an index.

In addition to these investments defined as complex by regulation, other investments may exhibit sufficient risk to require treatment as complex. Credit unions may have other investments carrying significant risk that do not fall within the definition of complex; however, these credit unions may require further examiner scrutiny of their IRR management process. For credit unions with complex investments, examiners should review the credit union's procedures for following the regulatory reporting requirements of §703.70 and §703.90.[2] If examiners determine a credit union has a simple structure, they can limit the scope of the examination.

Policies and Procedures

The IRR examination review is mostly qualitative in nature with the examiner looking at the various areas of a credit union's IRR management process. The examiner should review the credit union's IRR policies and procedures and determine if they adequately correspond to the size and complexity of the balance sheet. The credit union's practices should effectively implement the policies and procedures. Although the regulations do not require an IRR management or ALM policy, safe and sound business practices do.

However, no requirement exists for a separate IRR or ALM policy independent of other policies, even for large, complex credit unions. Credit unions have the option of either creating a separate IRR or ALM policy or incorporating it into Investment, Cash Management, or other policies. The form of the policy is not as important as its scope. Regardless of form, credit unions should clearly document their IRR management program in writing.

The scope of the policy will vary depending on the complexity of the credit union's balance sheet. A credit union that offers personal loans, invests in non-complex or short-term bullet investments (a debt security that returns 100 percent of principal on the maturity date), and offers basic share products may not need to create an elaborate policy. The policy for these credit unions may limit the loan portfolio maturity, require a minimum amount of short-term funds, and restrict the types of permissible investments (e.g., Treasuries, bullet bonds.)

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[2] RegFlex removes the shock test requirement under §703.90 for qualifying credit unions.

More complex balance sheets, especially those containing mortgage loans and complex investments, require a comprehensive IRR management policy. The policy should establish responsibilities and procedures for identifying, measuring, monitoring, controlling, and reporting IRR, and should establish risk limits. Overall, the examiner should determine the adequacy of credit union policies using the following guidelines:

- Written policies addressing IRR, and containing enough detail for the appropriate parties (e.g., board, ALCO, ALM program person, investment officer) to understand the risk limits and their individual responsibilities. Management should avoid vague language and boilerplate policies;

- Reporting requirements providing informative reports to decision makers in a timely manner. The policies quantify risk limits and provide for prompt identification of IRR so management can implement appropriate risk mitigation strategies in a timely manner;

- Risk limits for both short- and long-term cash flow horizons (e.g., both earnings and economic value perspectives, if appropriate); and

- Frequent policy updates addressing the risks inherent in the current balance sheet. When developing or updating policies, management should seek input from across the organization (e.g., board, ALCO, and operational departments such as lending and investments.)

The board should review the policies at least annually, and revise as the credit union makes changes to its business practices (e.g., types of loans, types of shares, and types of investments), introduces new strategies, or when the complexity, asset size, or sophistication of management changes. For example, when a credit union first offers a mortgage loan product, or offers a mortgage loan product with significantly different terms (e.g., new balloon product or home equity line of credit), the board should review the policies to determine if they address any additional potential IRR.

If possible, the policy should require the credit union to spread risk management duties among several divisions (e.g., senior management, lending, cash management, investments, and deposit activities), or assign them to a committee (e.g., ALCO) comprised of both credit union staff and board members. This integrates risk management into credit union operations. Small credit unions with limited staff and resources can vest these responsibilities with the manager and the board.

Effective IRR management programs require strong internal controls. Management must develop internal controls that promote accurate risk measurement and objective reporting. By separating risk-taker responsibilities (e.g., investment officer or CEO) from those responsible for measuring (e.g., ALM program person) and assessing (e.g., ALCO) risk, credit unions decrease the possibility of optimistic and inaccurate risk measurement results and, consequently, inappropriate decisions. If segregation of these duties does not exist, this shortcoming may lead to high IRR exposure. The examiner should determine if the policy addresses the internal controls governing the IRR management process.

Small or non-complex credit unions lacking available resources may have to concentrate risk taking and risk measurement responsibilities in a single individual. The board and supervisory committee should take an active role in monitoring the activities of the individuals. The board should also limit each individual's authority.

The basis of the IRR measurement should correspond with the complexity of the balance sheet: gap and simplistic (short-term) income simulations can suffice for simple balance sheets that primarily consist of short-term bullet type investments (e.g., Treasury bills or notes) and non-mortgage related assets (e.g., no real estate loans or mortgage-backed securities.) Credit unions with more complex balance sheets, including those with complex investments and real estate portfolios, require more sophisticated earnings simulations and economic valuation models (e.g., shocked mortgage and investment [asset] valuation or NEV.) As the complexity of the balance sheet increases, conducting multiple measures can prove advantageous since each methodology may measure IRR differently.

The IRR management or ALM policy should express IRR measures and limits in terms of gap, earnings (i.e., net income [NI], net interest income [NII]), net worth (e.g., mortgage portfolio shock, investment portfolio shock, change in NEV) or a combination of these. For all but the smallest or simplest credit unions, management should establish quantitative IRR measures to alert the credit union of the existence of unacceptable IRR exposure.

While a credit union may use other rate scenarios, and is encouraged to do so, at a minimum it should apply a +/- 300 basis point (bp) instantaneous, permanent, and parallel rate shock. Under this rate shock, the entire current yield curve (both short- and long-term rates) is assumed to shift 300 basis points from its current position immediately and without future movements. NCUA considers this a reasonable stress test.

For additional scenarios, the credit union may apply a yield curve twist by shocking only a portion of the yield curve, such as short-term rates, or apply a ramped rate scenario by adjusting the yield curve gradually over time, generally 12 months. The credit union may also analyze basis risk by measuring the impact of changing relationships between indices (e.g., 90 day Treasury bill versus 3 month LIBOR.) The more scenarios the credit union runs, the better its understanding of potential sources of risk.

For credit unions with complex balance sheets (e.g., mortgages and complex investments), management should provide IRR measurement reports to the board no less frequently than quarterly. In cases where the balance sheet changes frequently and significantly, management should consider providing monthly reports. The board may receive IRR measurement reports less frequently if management provides such reports to an ALCO (preferably, with at least one board member on the ALCO) and the ALCO alerts the board to significant events (e.g., approaching or broaching a policy limit.) Semiannual board reports may suffice for less complex credit unions.

IRR policy limits, commensurate with the earnings and net worth position, mean that highly profitable and well-capitalized credit unions may establish less restrictive limits than those less profitable or with lower capital. Management should consider the degree of

precision and accuracy of the risk assessment model when determining acceptability of a risk limit. A sophisticated model that properly addresses prepayment and other option risks will likely experience less measurement error; therefore, a looser limit may suffice. Conversely, if the risk measurement model and depth of analysis or precision is low, then the credit union should tighten the risk limits to compensate for potential inaccuracies. Refer to the IRR measurement section of this chapter for further discussion.

Sample Credit Union Policy Limits for IRR

Basis of measurement	*IRR Limit*
Gap:	beyond +/- 20 percent change in any given period, or cumulatively over 12 months
Earnings Simulation:	
NII	after shock change >30 percent over any 12 month period
NI	after shock change >75 percent over any 12 month period
Asset valuation:	after shock change in book value net worth >50 percent or after shock value of net worth < 4 percent
NEV:	after shock change in market value net worth >50 percent or after shock value of net worth of <4 percent

Table 1

IRR limits exceeding the parameters in Table 1 indicate possible red flags (all limits assume a +/- 300 basis point instantaneous and permanent interest rate shock.)

A red flag exists if the credit union exceeds the limits of the IRR policy. This could signal that (1) the risk assessment methods used did not adequately identify potential risks, (2) the credit union failed to take prompt action to reduce the risk exposure, or (3) management's efforts ineffectively reduced the risks. However, the possibility exists that unforeseen events caused the credit union to exceed the risk limits and the credit union actually took prompt corrective action to mitigate future risk. Examiners should expect management to explain the underlying causes and the resulting credit union action.

Planning and IRR Management

Examiners should review how the credit union integrates the IRR management process with strategic and financial planning. They should determine if strategic planning occurs at ALCO meetings, or if planning represents a separate function. Strategic planning meetings should include the ALCO, who should have an opportunity to comment on proposed plans. Exclusion of the ALCO from strategic plan development impairs IRR management integration into the planning process. Overall, the examiner should review the following to determine if the credit union adequately integrates IRR management and planning:

- The credit union considers the effect of future events on its IRR exposure;
- The credit union adopts strategic plans after considering the risk/reward relationship. The credit union appropriately analyzes and measures the IRR associated with new products, services, or investments;
- The credit union includes ALCO and other persons with ALM responsibilities in the strategic planning process;
- The credit union updates IRR policies and risk limits as necessary and in a timely manner to reflect the projected risk profile;
- ALCO minutes document that the committee actively assesses risk and makes recommendations to the board to mitigate risk or improve the IRR management program; and
- The credit union conducts periodic assessments to compare actual performance with the plan.

Management may establish new risk limits during the strategic planning process. If so, management should support its rationale for the change. If the strategic plan shows significant growth in services, products, or account balances, the examiner should see an explicit integration with the IRR policy and associated risk limits.

For example, during the strategic (financial) planning process, credit unions should consider the effect on balance sheet IRR resulting from changes to the following:

- Share and borrowing portfolio structure (e.g., non-member shares, high rate money market accounts, long-term advances, or insufficient early withdrawal penalties on CDs);

- Loan portfolio structure (e.g., longer maturities [>5 years], prepayment risk, or non-conforming real estate loans);

- Investment portfolio structure (e.g., lengthening maturities, inverse floaters, dual-index floaters, or callable securities); and

- Future events forecast by management that may have a material effect on balance sheet structure and IRR (e.g., merger, aggressive growth plans, sponsor layoff, or restructure.)

Management should measure the potential effect of projected changes in balance sheet structure. They should model projected balances or product (investment) mix changes under different interest rate scenarios to determine the risk exposure of projected changes.

If credit unions simply adjust product rates in line with market rates, their IRR management programs should not require significant in depth analysis. However, balance sheet exposure changes when the credit union adds products or investments with different:

- Maturities (e.g., 20 years versus 5 years);
- Cash flow behavior (amortizing/callable cash flow versus a bullet);
- Floating rate indices (e.g., Prime versus LIBOR); or
- Repricing intervals (e.g., 1-year versus 5-year ARMS.)

If the credit union has implemented a new loan or share program since the last examination, the examiner should determine whether the credit union performed due diligence by (1) performing an IRR analysis that addressed the characteristics of the product, and (2) documenting its assumptions and analysis. For example, implementing a mortgage program would require comprehensive understanding of prepayment risk and proper analysis of IRR. Similarly, if a credit union currently offers personal loans and chooses to begin offering home-equity lines of credit (HELOCS), it must address the effect on the current portfolio of uncertain cash flows (e.g., draws or prepayments) and other variable rate features. It must also determine whether the existing data processing system can properly handle HELOCS.

Effective management of IRR depends on credit unions evaluating risk/reward relationships and setting appropriate limits on new programs. If the credit union knows about a planned future event (e.g., sponsor layoff, credit union merger, etc.), it should analyze the pro forma effect on its financial standing, especially on IRR exposure. This also applies to credit unions dependent on an industry experiencing turmoil. Further, credit union mergers can radically change the continuing IRR profile, if the merging entities have different asset/liability mixes. Prudent credit unions will conduct pre-merger risk analyses.

Finally, the credit union should conduct periodic assessments to compare the actual performance with those forecasted. Self-assessments of prior projections and plans enable the credit union to (1) identify inaccurate or unreasonable assumptions or other causes for discrepancies, and (2) improve the validity of future projections.

Oversight, Monitoring, and ALCO

The ALCO typically provides management oversight and guidance for the ALM program as a whole, including IRR management. The major responsibilities of ALCO include identifying and monitoring IRR and developing strategic risk mitigation strategies.

The depth of monitoring necessary for the IRR management program will depend on the credit union's size and relative complexity. Smaller, less complex credit unions with simple balance sheets may not have (or need) an ALCO. They may only need to determine whether the balance sheet has changed significantly, and monitor general ratios (e.g., loan to share ratio, long term assets ratio.) A semiannual evaluation may suffice for these credit unions. More complex credit unions should have procedures in place requiring senior officials to consider the effect of strategic decisions on the IRR exposure, review risk results and ratios, and determine courses of action. These complex credit unions should monitor IRR at least quarterly.

Larger or more complex credit unions should have a well-organized ALCO with clear, relevant, and concise IRR management documentation. The examiner should review the composition of the current ALCO and determine whether members have staff or board

positions. Preferably, at least one board member will sit on ALCO. This improves communication between the ALCO and the board, and increases the board members' knowledge of IRR. The ALCO should consist of representatives across the credit union's divisions of responsibility (e.g., loan department, investment office, marketing department, CFO, and CEO) since IRR management decisions affect the entire credit union operation.

Officials involved with ALCO should have knowledge of the credit union's risk position and actual performance compared to stated objectives. While individual qualifications may vary, the ALCO members should understand IRR. The complexity of the balance sheet will influence the desired level of experience on the ALCO. That is, for simple balance sheets, a basic understanding of interest rate risk should suffice. For complex balance sheets, the committee should understand (1) specific sources of balance sheet risk, (2) risk measurement techniques, (3) risk measurement results, and (4) risk mitigation strategies.

As the degree of balance sheet complexity increases, so should the amount of training provided to ALCO members. Timely training enables members to remain versed on contemporary ideas. Weaknesses in the IRR management process may signal a need for training. Examiners may review the level of training provided to ALCO members since the prior examination.

Overall, the examiner should assess the adequacy of the ALCO's oversight of the ALM program by determining if the ALCO:

- Provides adequate documentation of its discussions and actions, and demonstrates it meets its prescribed responsibilities;
- Understands that IRR risk concepts adequately coincide with the amount of risk permitted;
- Comprehends the risk measurement reports so that it effectively assesses interest rate risk and makes proper recommendations to mitigate risk;
- Attends training regularly on contemporary IRR management issues and risk measurement methodologies; and

- Understands the key assumptions driving the model to ascertain the accuracy of results and precision of risk measurement reports, and offers recommendations for improvement.

The examiner may review ALCO minutes, noting whether the ALCO holds meetings as required by policy. Minutes establish a formal record of ALCO meetings and member attendance. Lack of minutes may indicate the ALCO is inactive, does not follow a consistent agenda in which it evaluates risks, or does not make formal recommendations to the board.

Examiners should note as a finding ALCO's failure to meet as required. By not meeting as required, ALCO not only violates board policies, but it also fails to monitor risk on a regular basis. Examiners may want to consider interviewing ALCO members to determine the extent to which they understand and meet their ALCO responsibilities.

Examiners should review the types of decisions and discussions documented in the minutes. For ALCO meetings, the minutes should evidence that ALCO:

- Reviews IRR exposure and compares the results to ALM policy limits;
- Develops alternative plans when risk in the credit union approaches or exceeds risk thresholds; and
- Discusses and determines whether the current risk measurement system adequately evaluates IRR and liquidity risk exposures. For credit unions with in-house IRR measurement models, this could include the engagement of an outside IRR vendor or consultant to test and validate the IRR modeling process.

As a key user of the model's output, the ALCO must understand the key assumptions driving the results. While the ALCO need not have a thorough knowledge of the underpinnings of the model (e.g., understanding how the model estimates prepayments on amortizing accounts), it should have a broad understanding of model assumptions. For example, it should recognize that mortgage prepayments would vary with changes in market interest rates (e.g., due to the refinancing incentive.) As the key user of the risk

measurement output, ALCO should appropriately determine the shock scenarios (e.g., applying an instantaneous 300 basis point shock) and establish the balance sheet forecasts (if the credit union uses a dynamic balance sheet approach for earnings simulations.)

The minutes should reflect the ALCO's proactive actions to mitigate risks before they approach or exceed established limits. If the ALCO does not take action before risks exceed limits, it is not effectively directing the IRR management program. Furthermore, the credit union may miss the opportunity to implement corrective action in a timely manner (e.g., it takes time to sell loans or arrange for financing), or to contain the costs involved (e.g., if problems arise, creditors may rate the credit union as a higher risk, resulting in higher borrowing rates.) Acting proactively requires the ALCO to develop alternative courses of action, and prioritize them based on cost/benefit relationships, long-term effectiveness, and timely implementation.

The ALCO should understand whether the risk measurement model's sophistication is commensurate with the complexity of the balance sheet. For example, if the balance sheet consists of embedded options and uncertain cash flows, the ALCO should understand whether the model could reasonably measure the effect of these characteristics on the credit union's IRR exposure (e.g., gap and simplistic income simulations would not suffice.)

The ALCO must understand if it receives sufficiently accurate and precise information on which to make informed decisions about the risk profile of the credit union. Therefore, in addition to evaluating current risk measurement outputs, it should question whether other available alternatives could reasonably improve the risk measurement process (e.g., the benefits justify the costs.) The absence of recommendations does not necessarily indicate an adequate system or appropriate output reports. It could signal the ALCO does not have the experience and understanding to make recommendations for improvement.

Examiners should determine whether the ALCO has developed or recommended changes that the board did not adopt (e.g., using a different model, restructuring the IRR management responsibilities,

or adding additional internal controls.) If the board does not respond to recommendations for improvement from the ALCO, it could indicate the board does not understand IRR management or does not embrace it as a management tool.

Examiners can conclude that the credit union does not have an effective ALCO if it has a weak IRR management process and if the ALCO did not know of the problems identified during the examination or supervision contact. Likewise, the ALCO does not meet its responsibilities if it knows of weaknesses but does not resolve them.

IRR Measurement Review

Credit unions should measure IRR no less often than semiannually, assuming the balance sheet does not incur any significant changes (e.g., a rapid growth in fixed rate mortgages, a significantly lengthened investment portfolio maturity, a new CD program attracting a large number of member shares.) For federal credit unions, *NCUA Rules and Regulations* §703.90 requires quarterly measurement if complex securities exceed net worth (unless the credit union receives an exemption under RegFlex provisions.) Less complex credit unions may employ basic gap and other models, while larger or more complex credit unions should employ more sophisticated earnings simulation and/or valuation models, which they run internally or obtain from outside vendors.

IRR Measurement Staff Review

IRR management is a dynamic field that requires frequent updating of risk measurement methodologies to reflect current risk measurement techniques. Outsourcing the risk measurement process does not absolve management from understanding the assumptions driving the results. The complexity of the credit union's balance sheet and risk measurement model will determine the need for an experienced IRR measurement or program person. (Appendix 13A provides a brief description of IRR measurement tools.) The experience of the program person may reflect the credit union's interest in implementing a strong IRR management program.

An effective program person should understand how the model works, and what key assumptions drive the results. For example, the

program person should understand which assumptions require changing in order to tailor the model to the credit union (e.g., mortgage prepayments and non maturity share runoff.) A program person with weak skills will more likely produce inaccurate modeling results, which will demonstrate the need for further training. Conversely, a talented program person should consistently develop reasonable risk reports and make recommendations to improve the risk measurement process.

Training of the program person will help ensure the credit union uses the program proficiently, better understands the model's capabilities and limitations, and accurately measures risk. The initial training should enable the program person to understand the more intricate functions of the model. The degree of training needed will depend on the risk inherent in the balance sheet. A balance sheet consisting of complex securities and mortgage-related assets necessitates more intricate risk measures (e.g., NEV versus gap) than a simpler balance sheet primarily composed of bullet instruments and consumer loans.

The program person should obtain additional training to stay current with the changing climate. For example, if a credit union purchased a model before it implemented a mortgage-lending program, it may not have used the prepayment function of the model originally. However, further training on the prepayment capabilities may prove beneficial because of the mortgage program.

Examiners should review the experience and background of the persons charged with determining the model assumptions and interpreting the output (e.g., program person.) They should determine what training on contemporary IRR measurement concepts the program person has attended.

Examiners may want to discuss the model's strengths and weaknesses with the program person. They should determine the program person's level of understanding of the credit union's risk measurement model. For example, does the program person recognize use of model default values and, if so, can the program person explain the validity of the default values.

Credit unions need backup persons to ensure continuity in the risk measurement process. The backup should also receive full training on the model. The examiner should determine if the credit union has a backup program person, and inquire as to what training the backup has received on the model used.

Overall, the examiner should determine the following to assess the adequacy of the IRR measurement program's ability to generate sound and reasonable IRR measurement results:

- Staff's familiarity with the assumptions driving the model and experience with the model's basis for measurement (e.g., earnings simulation or NEV);
- Default assumption adjustments (e.g., prepayment rates, non-maturity deposit runoff rates) that tailor the model to the credit union. Staff has the institutional knowledge to determine if the model produces accurate results, and regularly makes improvements to the model or its assumptions;
- Assignment and training of a backup person, who can adequately use the model without supervision of the program person;
- Documentation of assumptions to ensure consistent measurement between periods; and
- Validation by a third party for reasonableness of model results for large or complex credit unions.

Review of IRR Measurement System

The credit union's review of the IRR measurement model should ensure that data and assumptions accurately represent its balance sheet and risk profile (e.g., accurate input of balance sheet accounts, rates, and maturities.) By examining the input data directly or testing the output against a benchmark, a credit union could test the model's output. For example, a credit union could benchmark its real estate loan portfolio valuation against the OTS Pricing Tables, or the Mortgage Pricing Tables in AIRES.

Someone other than the person running the model (e.g., supervisory committee, internal/external auditor, supervisor) should conduct the review of the IRR measurement model. The reviewer of the modeling system should understand IRR and the risk measurement system, including the model's methodologies and assumptions. If the supervisory committee or other credit union personnel assumes this task, they should attend periodic training on the model.

Internal controls should require documentation of the key assumptions (e.g., stressed interest rate environment, cash flow assumptions of non maturity shares) for review by the examiner, board, and ALCO. Credit unions should rarely make changes in assumptions, unless they make refinements to improve the underlying quality of the assumptions (as is likely for prepayments because prepayment performance changes over time.)

The model reviewer should look for documentation supporting the underlying assumptions and input, and compare the assumptions to market trends or performance through industry-recognized information providers. For example, the reviewer may benchmark the credit union's prepayment assumptions against (1) generic prepayment data provided by FNMA, or (2) comparable mortgage-backed securities as reported by a financial information supplier (vendor.) Alternatively, the reviewer may benchmark the output against other available data (e.g., the OTS and NCUA real estate loan pricing tables to compare valuation results prepared by the model.) If differences exist, or assumptions appear unreasonable, the reviewer should ask the model program person to reconcile or explain the differences.

If the reviewer does not understand the model, this may hamper the value of the recommendations. Thus, the absence of any recommendations does not necessarily indicate a problem-free modeling process. If the reviewer has made recommendations, examiners should determine whether the credit union acted on them. If not, they should determine the reasons. Lack of a plausible reason could signal that the officials have not embraced the value of accurate risk measurement.

Examiners should determine whether the credit union has established internal controls to ensure the risk measurement input accurately reflects the credit union's financial data. At a minimum, the credit union should reconcile or test the data input against the financial statements to make certain all accounts are in the system. Good internal controls should prevent the program person from also assuming risk-taking authority (e.g., executing investments, or establishing rates on shares and loans.) Certain models provide diagnostic reports to readily identify implausible assumptions or data input. (Examiners can refer to the ALM Public Folder for more information on specific IRR measurement program vendors.)

The examiner should determine who evaluated the reasonableness of the risk measurement system inputs and assumptions and whether it was someone other than the program person. The examiner should ascertain what steps the credit union took to determine the reasonableness of the input and assumptions.

Examiners should determine if the reviewer made any recommendations, and if the credit union implemented these recommendations (especially if the recommendations cover a wide scope of deficiencies.) Examiners should further determine if the board and ALCO knew of errors that could significantly misrepresent the results.

Finally, examiners should determine what steps the credit union has taken to ensure meaningful comparison of results between periods. Consistent measurement between periods enables understanding of the changing risk structure of the balance sheet and identification of the underlying causes. Examiners should take exception if assumptions change from period to period without reasonable cause. The results will likely mislead decision makers (e.g., the ALCO and board) resulting in inappropriate decision-making. The examiner should ascertain whether the credit union documents its assumptions, and makes users of the results aware of changes in key assumptions.

IRR Measurement Techniques and Level of Risk

Credit unions can purchase IRR models from vendors, contract with vendors to perform the analysis, or develop their own proprietary systems. The source of the measurement tool is not important as long as the credit union can obtain a reasonably accurate measurement of IRR, and the credit union understands the methodologies and assumptions driving the results.

Reviewing a model's capabilities and the assumptions driving a model requires a comprehensive understanding of the risk measurement system. This can involve understanding a complex process. If the examiners find that the degree of model or user sophistication exceeds their ability to determine whether the model system reasonably measures IRR, they should consult with their supervisor to seek additional assistance (e.g., request assistance by the regional capital market specialist [RCMS] or a capital market subject matter examiner [CM SME].)

Overall, the examiner should determine the adequacy of the degree of measurement precision and accuracy, based on use of the model, not simply its capabilities, as follows:

- The basis for risk measurement is commensurate with the complexity of the balance sheet (e.g., the credit union relies on sophisticated earnings simulation and economic valuation models to measure IRR in a complex balance sheet);

- The measurement horizon captures the short and long-term risk embedded in the balance sheet (e.g., the model analyzes cash flows, earnings, and value over the entire maturity range of accounts);

- The model accounts for mortgage prepayments or interest rate caps when the credit union holds significant portfolios of real estate loans or floating rate assets;

- A reasonable degree of accuracy exists because appropriate and rational assumptions, valid data, and proper cash flow projections (e.g., properly modeling mortgage prepayments) serve as the basis for the results; and

- The credit union analyzes its balance sheet performance and characteristics, and tailors the model's assumptions to its balance sheet.

Table 2 illustrates how the examiner can use the credit union's IRR measurement tool to determine if IRR exposure is low, moderate, or high. Examiners should consider the degree of precision and accuracy of the risk assessment model when determining acceptability of a risk limit. A sophisticated model that properly addresses prepayment and option risk will have less measurement error; therefore, a looser limit may suffice. Conversely, if the risk measurement report has a low depth of analysis or precision, tighter risk limits may compensate for potential inaccuracies. All limits assume a 300 basis point instantaneous and permanent interest rate shock.

IRR Exposure

	---------- RISK ----------		
	LOW	**MODERATE**	**HIGH**
Basis of measurement			
Gap % change in any given period or cumulatively over 12 months	+/-10%	+/-10-20%	> +/- 20%
Earnings Simulation NII: after shock change over any 12-month period	<20%	20-30%	> 30%
NI: after shock change over any 12-month period	<40%	40-75%	>75%
Asset Valuation: after shock change in book value net worth	<25%	25-50%	> 50%
or after shock value of net worth	>6%	4-6%	< 4%
NEV: after shock change in market value net worth	<25%	25-50%	> 50%
or after shock value of net worth	>6%	4-6%	< 4%

Table 2

IRR Measures

The examiner should determine what IRR measurement methodologies the credit union uses to identify, measure, monitor, report, and control IRR. For short-term IRR measurement, income simulation provides more reliable results than gap analysis because it not only captures cash flows, but also it projects earnings. Gap analysis may not accurately project earnings because it does not consider interest rate caps or floors, the current rates earned and paid on accounts, and the indices driving floating rate accounts (e.g., Treasury versus Prime.) Credit unions should set earnings limits to measure IRR over two years, but preferably over a longer period (e.g., five years) if the credit union offers mortgage loans and does not perform economic value analysis.

As the complexity of the balance sheet increases (e.g., the credit union more heavily invests in mortgage loans and complex investments), the level of analysis should increase. Gap and simple income simulation models may suffice for simple balance sheets (e.g., assets concentrated in consumer loans and non-complex investments, and funded by member shares.) More sophisticated earnings simulation models and economic value models (e.g., asset valuation and NEV) would better serve complex institutions (e.g., assets include mortgage loans, mortgage-related investments, or complex investments, and liabilities may include borrowings.)

NEV and asset valuation analyses measure the change in net worth in a current and stressed interest rate environment (e.g., under a 300 basis point instantaneous and parallel rate shock.) Both are effective methods (although NEV can provide more precise results because it values shares and liabilities) for evaluating IRR over a long-term horizon (i.e., from the current period to the maturity of the measured assets and liabilities.) Asset valuation and NEV measure the credit union's current economic solvency and projected economic solvency under a stressed interest rate environment. These economic value measures can identify IRR that short-term measures such as gap and income simulation may not reveal.

Based on the complexity of the balance sheet, the examiner should determine whether the credit union's measurement method (IRR measurement model) appropriately measures short- and long-term risks. The examiner should review the rate shock scenario used to

measure interest rate risk and determine whether the credit union sufficiently stratifies assets by type and characteristic. For amortizing accounts (e.g., real estate and commercial loans, and mortgage-related investments [CMOs and mortgage pass-throughs]), the credit union should account for estimated prepayments. Examiners should determine that prepayment estimates (1) meet reasonableness expectations, and (2) have supporting documentation. Examiners should also determine that prepayment assumptions change during different interest rate cycles.

Examiners should review callable investment cash flows to ascertain whether they correlate with call dates under falling rate shock scenarios. By reviewing certificate cash flows, examiners can ascertain if the model accounts for early withdrawals by members under rising rate shock scenarios. Examiners should review the cash flows on borrowings to see if the model accounts for any puts (e.g., puttable FHLB advances) by the lender under rising rate scenarios. Finally, examiners should determine how the credit union treats cash flows on non-maturity share accounts (e.g., how they assign maturity.)

Gap Analysis

Gap analysis generally excludes consideration of prepayments, call options, and interest rate caps and floors. Therefore, gap analysis inappropriately measures IRR if the balance sheet consists of a large portfolio of mortgages and complex investments. Examiners should determine if the gap ratio complies with the credit union's policy limits. They should review the current one-year gap ratio and determine whether the credit union calculates gap on a cumulative or periodic basis.

Income Simulation

Income simulation models focus on short-term measurement of risk (typically less than five years), but can vary in sophistication. More sophisticated models capture the effect of prepayments, different floating rate indices (e.g., Prime, COFI, Treasury) and interest rate caps and floors, and can simulate a multitude of interest rate environments. If the credit union offers long-term (i.e., 15 or 30 year) mortgage loans, and invests in instruments with maturities exceeding three years, income simulation models may not adequately

capture the IRR in the balance sheet, since cash flows may exceed the model's measurement horizon.

Asset Valuation and NEV

Asset valuation and NEV measure IRR through estimating the economic value of financial assets and net worth respectively. These methods can effectively measure IRR over the entire spectrum of cash flows, if they also account for the effects of embedded options within the balance sheet. NEV provides a more complete measure of risk than asset valuation because it measures changes in liability values.

Appendices 13A and 13B provide additional discussion and resources on interest rate risk measurement approaches (i.e., gap, income simulation, asset valuation, and NEV). Appendix 13C contains a glossary of ALM terms.

Red Flags

Examiners should remain aware of the following potential warning signs that may indicate a problem in IRR management. Many credit unions will have some degree of one or two of these elements. These may not result in safety and soundness concerns. However, if several of these signs exist, or if they are material, the examiner should treat IRR management as an area of concern and develop plans to address the problems.

- High level of long-term assets to total assets. The concern is a high concentration of assets with maturities longer than three years will reduce the credit union's ability to react to changing interest rates and expose it to increased interest-rate risk.

- High level of net long-term assets to total assets. This concern is similar to that above; however, even a low net long-term asset ratio does not automatically eliminate the concern about high concentrations of long-term assets. Even variable-rate loans have different terms and conditions for repricing that could potentially present IRR concerns. The examiner should determine that the indexes, margins, repricing intervals, caps, and floors all provide sufficient protection against interest rate exposure.

- Declining net interest margin. This indicates either asset yields falling faster than the cost of funds or the cost of funds rising faster than asset yields. Examiners should address both IRR concerns and should determine whether the credit union has any options to improve the net margin (e.g., raising loan rates or lowering dividends.)

- Low level of net worth. A low level of net worth, or a level of net worth that is not keeping pace with share growth, weakens the credit union 's ability to absorb losses and react to changes.

- Rapid share growth or above market dividends. Share growth that outpaces the ability to generate sufficient net income reduces the overall strength of the credit union's net worth. Above-market rates tend to attract less stable rate-sensitive shares. If the credit union then invests these sensitive deposits in longer-term assets (e.g. real-estate loans), it creates a mismatch of maturities for assets and liabilities that could further increase exposure to IRR.

- Incremental mismatch of asset and liability maturities. Given the difficulty of identifying balance sheet interest rate risk at a specific time, the examiner may benefit from analyzing the changes in balance sheet structure since the last examination contact or over the last full year. For example, if a credit union that did not have a significant long-term asset ratio increased its share base into more rate-sensitive deposits (certificates of deposit, money market funds, shares greater than $10,000, etc.) during the last year, then loaned out these deposits in longer-term fixed-rate loans, the incremental additions to the balance sheet may have significant IRR exposure.

  The Call Report (NCUA 5300) requests type and maturity information for loans, investments, and shares. Examiners can analyze this information to determine if recent product or pricing decisions create a mismatch. If so, the examiners should discuss with the officials the potential for emerging IRR concerns before they become more serious.

- Lack of IRR management or ALM policy. Some credit unions can operate effectively without a formal policy; however, the lack of a written policy often indicates that management remains unaware of the importance of IRR management.

Interest Rate Risk and CAMEL

Although examiners should perform a quantitative analysis on every examination, the more subjective overall analysis of IRR management in CAMEL depends largely on examiner judgment. The examiner should keep the size, complexity, and other component ratings of the credit union in mind when evaluating IRR management.

Even so, a small "plain vanilla" credit union (shares and loans only) should have:

- Strong net worth and stable earnings;
- Investments with relatively short-term maturities or an acceptable mix based on share structure and size; and
- Adequate cash management procedures.

A large, complex credit union offering many different services and having a diverse share, loan, and investment portfolio requires a more in-depth understanding of IRR, and a formal (preferably automated) process to measure balance sheet position and performance.

If the credit union lacks key elements (e.g., no IRR management policy or inadequate monitoring mechanisms), the examiner should expand the evaluation of the adequacy of IRR.

Examiners should develop a DOR with management requiring establishment (or implementation) of IRR management policies and procedures within a reasonable period of time, if the credit union experiences the following:

- An apparently high amount of IRR;
- No IRR management policies or procedures; or
- Policies and practices having serious inadequacies.

Depending on the degree of apparent risk, the examiner may decide to plan a supervision contact to ensure compliance within established time periods. If the credit union's assumptions or conclusions regarding IRR exposure appear seriously inaccurate, examiners should consider including a RCMS or CM SME to assist with this aspect of the review.

Workpapers and References

- Workpapers
  - Interest Rate Risk Questionnaire (IRRQ) – a supervision tool to assist examiners in evaluating IRR. Part D, Step 5 (IRR Measurement Review) specifically discusses evaluating measurement of IRR.
- References
  - NCUA Letter No. 99-CU-12, dated August 1999, *Real Estate Lending and Balance Sheet Risk*
  - NCUA Letter No. 00-CU-08, dated November 2000, *Camel Rating System*
  - NCUA Letter No. 00-CU-10, dated November 2000, *Asset-Liability Management Examination Procedures*
  - NCUA's Public Folders – Under the ALM Folder (Public Folders are for Internal Use Only)

    Introduction to Interest Rate Risk Modeling – summary of key components of modeling IRR

    Interest Rate Risk Vendor Model Summaries – summaries of IRR measurement tools (commonly seen in credit unions) offered by vendors and ALM consultants

Chapter 13 – Part 3

ALM – LIQUIDITY RISK

Examination Objectives

- Determine adequacy of credit union's liquidity
- Determine demands on liquidity due to current circumstances
- Determine whether trends are emerging that may cause future liquidity demands
- Determine whether liquidity management processes sufficiently allow management to monitor the credit union's liquidity position on a current and forward basis

Associated Risk

- Liquidity risk may occur whenever management cannot satisfy the cash flow needs and demands for funds;
- Strategic risk may occur when the credit union takes on a significant new strategy that could affect the flow of funds (e.g., instituting an above market CD to attract new shares or implementing a real estate loan program); and
- Reputation risk may occur when the credit union cannot meet member loan and share funding requests, causing concerns about the credit union's solvency.

Overview

Liquidity management is the process of monitoring flows of funds and the liquidity of assets to meet demands for funds in the form of share withdrawals, loan demand, and the operating needs of the credit union. Management must monitor liquidity and anticipate future needs for funds. Understanding liquidity requires an appreciation of it as a matter of cash flow.

Managing Liquidity Risk

Liquidity risk management involves the following:

- Identifying the existence of cash flow demands;
- Measuring the extent of cash flow demands;
- Identifying emerging liquidity demands; and
- Taking corrective measures to minimize the liquidity risk and disruption of member services.

In smaller or less complex credit unions, management's approach to liquidity is sometimes very informal, relying mainly on the manager's knowledge of member deposit, withdrawal, and loan trends. This informal approach can suffice if the membership, management, and services offered will probably not change materially in the short term.

In a larger or more complex operation, the credit union may require a more sophisticated liquidity analysis, including a more detailed projection of cash needs. This projection or cash flow budget can take a variety of forms, but normally, a formal analysis of historical sources and uses of funds serves as the basis for the projection.

A credit union's sources and uses of funds includes the following:

Sources	Uses
- New share deposits	- New loans disbursed
- Loan principal payments	- Share withdrawals
- Interest income	- Operating expenses
- Fee income	- New investments
- Maturing investments	- Liabilities payments
- Borrowing	- Purchase of assets
- Repurchase agreements	
- Sale of assets (i.e., real estate loans in the secondary market)	
- Loan participations	

The safe and sound operation of the credit union requires that management monitor and maintain adequate liquidity. Smaller, less complex credit unions need not meet the same standards as larger credit unions; however, each credit union should follow sound business practices in liquidity risk management.

Examination Guidance

Examiners review liquidity through quantitative and qualitative analyses, including discussions with operational management, to determine if the credit union can meet member share and loan needs in a variety of circumstances. If examiners reviewed the 5300 Risk Parameters in the Scope Workbook (see the Risk-Focused Program

chapter for further discussion), they will have an initial indication of liquidity risk in the credit union. In reviewing liquidity management, the examiner should:

- Review the credit union's process;
- Alert the officials to any noted weaknesses;
- Determine that management sufficiently recognizes the overall significance of liquidity risks; and
- Ensure that the credit union maintains a safe and sound process of monitoring and controlling these risks.

An examiner's overall assessment of liquidity risk should include an overview of a credit union's operations, business plan, management strategies, and resulting cash flows.

The two main purposes for evaluating liquidity management are:

- Risk identification - determine whether any potential causes of liquidity risk exist; and
- Evaluation of management's control - assess whether adequate monitoring tools and methods exist to alert management to emerging liquidity demands in a timely manner.

Liquidity Policies

Credit unions should develop and implement a written liquidity policy (or plan for managing liquidity) tailored to the size and complexity of the balance sheet, and their susceptibility to cash flow volatility. Credit unions may incorporate their liquidity management policies in their ALM or investment policies.

The written policy should clearly establish the purpose, objectives, and goals of liquidity management. It should clearly set forth how the credit union will evaluate its liquidity (e.g., ratios, cash flow projections, minimum cash on hand.) Management should periodically review and revise, if necessary, the policies and plans to reflect the credit union's current tolerance for risk, balance sheet composition, liquidity strategy, and organizational structure.

Policies should clearly convey to management the board's tolerance for liquidity risk. A vague policy that omits risk limits, or provides

limits that would fail to alert management to liquidity demands is ineffective and indicates the board's failure to manage liquidity.

In smaller or less complex credit unions, officials should formalize the policies to ensure adequate management of liquidity risk. The clarity of these objectives will reflect the credit union's recognition and understanding of liquidity risk, and facilitate understanding and acceptance within the credit union. Credit unions with simple balance sheets may only need to:

- Set forth required minimum balances of short-term and overnight funds (e.g., corporate daily share accounts);
- Identify alternative sources of liquidity (e.g., lines of credit); and
- Establish limits in terms of simple ratios (e.g., loan to asset ratio.)

Larger, more complex credit unions should:

- Set limits in terms of ratios and projected net cash flows (cash inflows less cash outflows);
- Prioritize and periodically test alternative sources of funds;
- Assign responsibilities for monitoring liquidity; and
- Establish reporting requirements.

Policies should clearly define responsibilities to ensure accountability. For example, the board should establish prudent policies and limits, and senior management or the ALCO should implement the policies. The assignment of responsibilities should cover the detailed operational implementation of liquidity risk management, including monitoring liquidity, reporting results, and forecasting future needs.

Exceptions to risk limits may constitute a serious violation and should trigger more frequent reporting and measurement requirements. Credit union policy should outline the parameters and time frames for alerting senior management and the board, and implementing contingency plans.

Ratios

For purposes of quantitative analysis, several ratios can assist in assessing the level of liquidity risk at a credit union. The 5300 Risk Parameters (in the Scope Workbook) uses two ratios to indicate the initial level of potential liquidity risk: (1) Loans/Assets, and (2) (Regular Shares and Share Drafts)/(Total Shares and Borrowings.) Credit unions' quarterly call reports provide the data for quarterly updates to the 5300 Risk Parameters. The 5300 Risk Parameters represents one tool that examiners may use in offsite monitoring and for initial risk assessment.

If the initial risk assessment, examination planning, and scope development processes indicate a need for further evaluation, examiners may use the AIRES Liquidity Review Questionnaire (LRQ) while onsite to help assess liquidity risk and arrive at a final risk rating. The LRQ contains more extensive liquidity ratios that will assist examiners in their assessment of liquidity risk. The main ratios found in the LRQ follow:

- Loans/Assets. A credit union should strive to maintain a loan to asset ratio sufficient to meet member loan demand and still meet other liquidity needs. A high loan to asset ratio (e.g., in excess of 80 percent) may stress liquidity, especially if (1) the credit union has limited other funding sources, (2) existing funding depends on volatile sources (e.g., non-member shares), or (3) the credit union has minimal short-term investments.

- (Borrowings and Non-member Deposits)/(Total Shares and Liabilities.) Borrowings and non-member shares may indicate the credit union cannot meet its cash needs through member shares. Because these funds generally incur a higher cost and more volatility than member shares (i.e., lenders may not renew their funding if yields do not remain competitive or the credit union's financial condition deteriorates), they generally require a higher level of oversight to manage effectively.

- (Cash and Short-term Investments)/Total Assets. This ratio provides an indicator of how much available cash the credit union has to meet share withdrawals or additional loan demand. A low or rapidly declining ratio may indicate the credit union will be

unable to meet its current obligations. Credit unions should consider the trend in this ratio and determine whether the current level of cash and short-term investments represent what management has historically maintained, or whether management should increase the levels.

- (Regular Shares and Share Drafts)/(Total Shares and Borrowings.) This ratio reflects the level of stable deposits a credit union has on its balance sheet (as opposed to the level of volatile funding, which the Borrowings and Non-member Deposits ratio indicates.) A credit union can reasonably depend on the availability of these stable funds to meet liquidity demands.

Other ratios that may indicate liquidity concerns include the following (the AIRES LRQ contains definitions for these ratios):

- Loans/Shares;
- Contingent Liabilities/(Cash and Investments);
- Net Liquid Assets/(Liabilities and Shares);
- Volatile Liabilities/(Cash and Short-Term Investments);
- Growth in Volatile Liabilities/Assets;
- Investment Loss Ratio; and
- Estimated Loan Maturity.

Setting Limits

A key step in managing liquidity involves setting acceptable limits. Limits assist the board and management in determining the adequacy of the current level of liquidity and alert them to conditions where liquidity demands may disrupt normal business.

The board should set limits on potentially volatile sources of funds, such as borrowings, non-member deposits, and concentrations from a particular source. Prudent policies may establish concentration limits by asset category or cash flow structure, taking into account maturities and the certainty or uncertainty of cash flows (e.g., due to prepayments, extensions, or calls.)

Policies will usually express limits as a ratio, or required amount of funds on hand (i.e., the credit union will transfer funds greater than

$X or X percent of assets to the corporate credit union overnight account.) Ratio analysis may suffice for credit unions with abundant short-term assets and stable funding sources. Conversely, credit unions operating under tight liquidity constraints or uncertain cash flows may require a detailed cash flow analysis.

Alternatively, management may use liquidity gap analysis to project inflows and outflows of funds for the coming year. In this case, the policies set liquidity gap targets, which establish ranges or multiple limits to convey an increasing concern over liquidity demands. For example, a credit union may set a loan to asset ratio at 75 percent to trigger formal reporting to the board on a monthly basis, and 80 percent to trigger implementation of an action plan.

Other Measures

In addition to quantitative measures, qualitative elements may signal immediate liquidity concerns. Examples include:

- The loan, investment, or share structures have changed significantly, or significant changes will likely occur in the near future;
- The investment portfolio consists of a significant amount of assets or liabilities with principal cash flows subject to prepayment or extension risk;
- The credit union has attracted shares or non-member deposits by paying above market rates; or
- The credit union has experienced turnover in key management positions that relate to liquidity risk management.

Monitoring and Oversight

Credit unions must monitor liquidity and document their analysis. Small credit unions with basic share and loan products may perform an elementary analysis (e.g., reviewing the loan to share ratio or amount of cash and short-term investments on hand.) Larger, more complex credit unions should analyze projected sources and uses of funds, evaluate liquidity alternatives, and determine expected liquidity under adverse economic conditions.

A credit union should (1) monitor its liquidity over a timeframe commensurate with the composition of its balance sheet, and (2) provide its rationale as to the adequacy of its particular timeframe. A one-year proforma cash flow would not suffice, for example, if significant investment or share certificate maturities exceed one year.

Credit unions should also monitor contingent liabilities, which they may have to fund but have not recognized on their balance sheets. Most commonly, these commitments consist of unused lines of credit and credit card balances. Should members begin accessing these commitments under conditions of limited funding, the credit union could experience liquidity concerns. Failing to meet commitments can result in reputation risk and a loss of members.

The board should assign responsibilities for monitoring liquidity to persons capable of measuring risk, interpreting results, and presenting plausible and timely recommendations for action (e.g., the ALCO, or in the absence of an ALCO, a committee of the board, or senior management.) The background and experience of these persons should coincide with the size and complexity of credit union operations and the amount of liquidity risk present. This background and experience will enable the ALCO to forecast future liquidity demands, and take preventative action in a timely manner.

Larger, more complex credit unions (generally those greater than $100 million) should separate the risk measurement and risk taking duties. This provides a better independent assessment of liquidity and helps ensure prior decisions do not influence the risk assessment function. Those charged with risk measurement should report to the designated senior management official.

Persons responsible for liquidity decisions should meet regularly. They may have to meet more frequently if crisis conditions emerge or if the credit union takes on a new strategy that could affect the flow of funds (e.g., instituting an above market CD to attract new shares.) Examples of meeting agenda items include but are not limited to (1) reviewing cash flow projections and the current liquidity position, (2) evaluating liquidity alternatives, (3) determining potential future liquidity threats, (4) discussing the

impact of future economic events, and (5) recommending changes to policies and procedures.

Reporting

Ultimate responsibility for liquidity risk management rests with the board. Therefore, management must report existing or anticipated liquidity concerns in an accurate and timely manner. Early notice of emerging pressures enables the board to evaluate the cost/benefit relationship of the various alternatives and initiate action with minimal disruption in the credit union operations.

Credit unions with complex cash flows or a tight liquidity position should have detailed reports, possibly consisting of cash flow projections, ratio results, policy limit comparisons, and expectations of future liquidity. Smaller, simpler credit unions may only report the amount of cash and liquid investments maintained and the credit union's loan to share ratio. The size and complexity of the credit union should determine the frequency of these reports.

If the credit union has delegated liquidity oversight to a committee (e.g., ALCO), board reports may only consist of summary level data, such as compliance with policy limits. If the board has not delegated oversight, then the board should receive more detailed reports from which to make decisions.

Board reports should reflect the credit union's business direction, the composition of the balance sheet, and the volatility of its cash flows. The reports should also provide substantive information on which to make liquidity decisions. For example, reports may indicate liquidity trends, compliance with board-established limits, and changes in the credit union's cash flow structure.

Sources of Liquidity

Liability liquidity refers to the credit union's management of its liability and equity funding sources (e.g., borrowings, shares, and non-member deposits.) When credit unions need to acquire funds they should obtain funds at reasonable costs and structure the maturities or cash flows of liabilities to reasonably match against the uses of funds. The credit union should remain aware of the

composition, concentrations, costs, and characteristics of its funding sources.

Interest rates and creditworthiness influence the credit union's ability to access funding sources (e.g., borrowings.) Therefore, the availability of certain sources of funds, or availability at reasonable costs might not exist under all economic conditions. Thus, a credit union may find borrowings cost prohibitive at a time when its financial position weakens or the economy experiences rapid inflation.

Volatility is derived primarily from interest rate competitiveness and the credit union's creditworthiness. Credit unions should categorize funding sources based on their volatility or stability and should have the ability to defend their decisions. In particular, they should evaluate the volatility of non-maturity shares (e.g., regular shares, share drafts, money market accounts), which typically depend on managerial assumptions rather than empirical data.

Transaction accounts (e.g., share draft accounts) generally do not experience high rate sensitivity, because members retain these balances as a means of paying expenses. Conversely, money market shares and short-term certificates can represent highly volatile shares. Other volatile sources of liquidity include short-term external sources (e.g., borrowings and non-member deposits), which are more sensitive to interest rate risk and the perceived credit risk of the credit union.

Obtaining a significant concentration of funds from a single source, especially highly volatile sources such as short-term or callable borrowings, large dollar deposits, and business deposits, may subject the credit union to an unsafe level of liquidity risk exposure. Even if the credit union carefully maintains a competitive rate and sound credit posture, external factors (e.g., legal restrictions, business decisions) may adversely affect future funding.

Asset liquidity refers to the credit union's management of its asset funding sources. Evaluation of asset liquidity depends on the credit union's ability to convert assets to cash without loss. For example, it can convert the most liquid, overnight shares and deposits, to cash

immediately and without loss of principal. Cash flows also occur as investments mature or are called, and through amortization of loans and mortgage-backed securities. Other means of converting assets to cash include sales, securitized borrowings, and participation agreements.

While loan amortizations will provide a steady stream of funds, the credit union will usually use these funds to support future loans. Should the credit union not fulfill the member loan demand, it may disrupt normal operations, affect profitability, and lead to member concern about the credit union's solvency (i.e., reputation risk.) Therefore, unless principal pay downs result in excess investable funds, amortizations may not provide liquidity.

The credit union should manage its investment portfolio to reasonably match investment maturities or principal pay downs to potential outflows. Concentrations in maturities provide the same risk to liquidity as concentrations of cash flow sources. Thus, a credit union may benefit from staggering its maturities over time.

Investment maturities concentrated in long-term horizons may especially signal liquidity problems. The classification of an investment as held-to-maturity (HTM), available-for-sale (AFS), or trading does not impair its marketability. However, many credit unions are reluctant to sell HTM securities for fear that the sale will necessitate reclassification of the entire investment portfolio as AFS or trading. Thus, if a credit union carries a significant amount of HTM securities that have an unrecognized loss (e.g., market value less than book value), it may not willingly sell any security in the HTM portfolio. This may limit a credit union's liquidity options.

Loans written to secondary market standards have greater marketability than non-conforming loans. These loans can provide a significant backup source of funds to a credit union that has a large real estate portfolio.

Credit unions may also originate loans with the intent to sell them to increase cash flow. Asset securitization permits credit unions to sell their consumer loans (e.g., credit card receivables, auto loans, home equity lines of credit) as a source of liquidity. Besides the underlying

interest rate, the credit quality, as reflected in their delinquency and charge-off history, will determine the marketability of these assets. Higher credit quality will result in better prices. Therefore, credit unions that issue lower quality loans, without compensation in the form of higher interest rates, may experience significant losses when selling them.

Cash flow projections may provide greater benefit to larger credit unions, and those that operate with minimal asset liquidity or rely on volatile funding sources. Proper projection of cash flows requires expertise in understanding liquidity, a comprehensive understanding of the balance sheet structure, and time to construct the analysis. Credit unions can accomplish this by preparing a spreadsheet, or by using a maturity gap report (common in most vendor interest rate risk models.) Examiners should use judgment as to the necessity of recommending these tools.

The credit union should demonstrate that it made sufficient efforts to accurately capture cash flows. However, external causes determine many cash flows, not contracted agreements. For example, prepayments on amortizing instruments, embedded call options, and early withdrawals of certificates can affect liquidity. Further, recent share growth trends may include temporary, cyclical, or other trends unlikely to continue due to other forces (e.g., flight from equity investments in a recession.) The credit union should consider the potential effect of external events.

Though members can withdraw their shares at any time, their actual behavior may differ considerably. On average, most members retain a certain balance in their share accounts. Therefore, the credit union need not maintain cash equal to its regular shares. The effort required to open an account at another institution may result in "maturities" for transaction accounts (e.g., share draft accounts) of several years. Share draft accounts do not generally fluctuate significantly with changes in interest rates.

Conversely, money market shares and short-term certificates will likely experience high volatility, therefore shorter "maturities" are appropriate. Short-term external sources of liquidity (e.g., short-term borrowings and non-member deposits) also fall within the volatile

category, because of their sensitivity to interest rate risk and the perceived credit risk of the credit union. While longer-term shares and external funds can provide stable sources of funds, the credit union must consider early redemption options when making this evaluation.

Credit unions should not assume that business will always continue as it has in the past. Stress conditions could arise from rising unemployment, increases in equity investments, or member dissatisfaction with the credit union's services. These could manifest themselves in credit deterioration, unusually high interest rate volatility, reputation risk, and systemic events (e.g., anti-inflationary monetary policies.) Resulting liquidity demands may extend beyond what the credit union has available to it through "normal" liquidity sources (e.g., lines of credit). Therefore, the credit union may need to explore emergency sources of funds such as loan sales or a liquidation of other assets.

A third source of liquidity is **operating liquidity**. A credit union will experience cash flows from its normal daily operations, as well as from ongoing business activities. Operating income and expenses will affect the credit union's liquidity position. Excessive operating expenses can affect a credit union's liquidity on an ongoing basis. Marginal profitability results in a reduction of a credit union's cash flow from income.

The oversight of liquidity should include consideration of the sources of, and causes of demands on liquidity, from all its points of origin. There is no substitute for thorough analysis of each contributing factor in liquidity because, in most cases, liquidity pressures arise due to multiple causes occurring simultaneously.

Backup Sources of Liquidity

Credit unions should educate themselves regarding alternative backup sources of funding to those that occur within the normal course of operations. All credit unions should establish at least one means for generating cash or funding liquidity needs outside of normal operations. Typically, a credit union will establish a line of credit with its corporate credit union or another lender (e.g., FHLB.) Whatever the source, quick accessibility and reasonable cost are

important. The credit union should have demonstrated its ability to access the source. For example, if a credit union has not sold loans in the past, it should not anticipate using loan sales as a primary source of liquidity.

The credit union should remain aware of recent trends, future events, or management decisions that may have a material effect on the balance sheet's liquidity structure. Examples would include (1) new loan, share, or investment strategies; (2) merger; (3) aggressive growth strategies; or (4) declining trends in asset quality.

Activities Affecting Liquidity

The examiner should understand that the maintenance of adequate liquidity and the management process to monitor liquidity are vital to the safe and sound operation of a credit union. Smaller credit unions need not meet the same standards as larger credit unions; however, each credit union should follow sound business practices in liquidity risk management.

The following activities of a credit union's operation are important in the assessment of liquidity:

- Borrowed funds;
- Repurchase agreements;
- Non-member deposits;
- Real estate and other loan sales; and
- Loan participations.

Borrowed Funds

Credit unions should plan borrowings for a specific purpose that management can reasonably explain. When the credit union borrows funds, they should document a plan for repayment of the funds. Management should understand all terms of the borrowings, including call features, prepayment penalties, and debt covenants.

Generally, examiners should accept preplanned borrowing for a specific purpose or strategy. For example, a credit union may borrow on a long-term basis to fund real estate loans. Properly structured, this reduces the liquidity risk resulting from funding long-term assets with short-term liabilities. However, frequent,

chronic, and unplanned borrowing may evidence liquidity problems. Prepayment penalties, embedded call options, and other indentures may preclude borrowing as an effective liquidity management tool. (Appendix 11A contains definitions of embedded options and indentures.) Borrowing subjects the credit union to potential volatility because interest rates and the creditworthiness of the borrower can influence lenders.

Examiners should consider short-term borrowings highly volatile sources of funds. Concentrations of these funds could subject the credit union to liquidity demands in uncertain economic times, or if the credit union's credit standing deteriorates. Longer-term borrowings generally provide a stable source of funding, although the credit union may incur a premium cost. Embedded call options can reduce the stability. Further, the credit union may be precluded from prepaying borrowings at opportune times (e.g., to refinance at a lower rate, return the funds due to excess asset liquidity.)

Repurchase Agreements

Borrowing repurchase agreements (repos) provide an alternative source of funds that may cost less than lines-of-credit. However, sales or early redemptions of repurchased investments may have significant limitations that prevent collateral sales from serving as a liquidity source. The credit union must execute a master repurchase agreement before it can participate in repurchase activities. Legal counsel should review the agreement before the officials agree to its terms; therefore, the credit union should execute the master agreement before potential liquidity needs arise. If the credit union has not executed the agreement, borrowing repurchase agreements may not provide immediate sources of liquidity.

The credit union must have available high-grade investments (typically, short-term Treasuries and agencies) to engage in repurchase activities. Otherwise, a broker/dealer will not accept the collateral or will charge a higher 'haircut' (excess collateralization—typically the collateral to book value is set at 102 to 103 percent for Treasury and agency securities, and possibly higher for other instruments.)

Non-member Deposits

Non-member shares can provide the credit union with a liquidity source that it can tap quickly. However, these funds may require a higher dividend rate than member shares to entice institutional investors (e.g., other credit unions.) Further, these shares generally have high rate sensitivity and a strong likelihood of their withdrawal exists should alternatives offer better returns. Thus, these shares may not provide a low-cost, long-term funding source. Accordingly, the credit union should develop a plan to address the increased funding costs and high volatility associated with these shares. Failing to do so may result in depressed earnings and future liquidity shortfalls.

Examiners should consider short-term non-member deposits highly volatile sources of funds. Concentrations of these funds could subject the credit union to liquidity demands in uncertain economic times or if the credit union's credit standing deteriorates (especially if the deposit exceeds the insurable amount).

Real Estate and Other Loan Sales

If the credit union has not engaged in a loan sale, it may not recognize the administrative and procedural requirements to complete the sale (i.e., meeting secondary market standards.) Arranging mortgage sales generally involves the buyer, thus precluding sales from being an immediate liquidity source. In addition, prices will vary based on the underwriting quality (e.g., meeting secondary market standards), transfer of servicing rights, current market rates, and selling loans with and without recourse (the ability of the buyer to return the asset to the seller.) Thus, experience in selling loans could increase the credit union's awareness that liquidity may come at a significant cost.

If the credit union has not engaged in prior sales, it may not recognize the potential for losses on loan sales. Accordingly, loan sales may not serve as a realistic source of liquidity, especially if the loan portfolio consists of low coupon mortgages, or the loans were not written to secondary market standards. Credit unions that regularly engage in mortgage lending may have established a mortgage pipeline with the secondary market (e.g., FNMA, FHLMC) to facilitate loan sales. Typically, credit unions that sell loans, sell them on a monthly basis (FNMA and FHLMC set

minimum sales requirements.) If the pipeline is well managed, loan sales can provide a reliable and cost effective source of liquidity.

Recourse refers to the right of the loan purchaser to recover against the credit union, typically from default by the borrower. If the credit union sells a loan with recourse, the purchaser can choose to recover the losses from the credit union rather than from the borrower. Loans sold with recourse can adversely affect a credit union's liquidity because the participating organization may seek a refund of its entire investment. Accordingly, the credit union should closely monitor the performance of loans sold with recourse to project future cash flows.

Loan Participations

Loan participation represents another potential source of liquidity for credit unions. This can and often does include non-real estate loans, such as signature or vehicle loans. Typically, participation involves an agreement between two or more credit unions or other types of financial institutions, and includes a pool of loans. A written agreement should document the transaction and its details, including the identification of the loans involved. Credit unions should have the agreement reviewed by legal counsel, prior to implementation.

In this type of liquidity source, the selling credit union would retain a percentage of the loans, usually 10 percent or more. They would also retain servicing. Thus, the transaction remains transparent to the member. The agreement should include details about (1) whether the sale is with or without recourse, (2) whether buy-back provisions (rider) exist and the timeframes for such provisions, (3) whether the seller can repurchase the balance of the loans at a later date should their level of liquidity increase, and (4) what if any compensation the seller would receive for servicing the loans. As consumer loans have a shorter life and require less servicing, the liquidity afforded through the participation may overshadow the compensation in importance.

Many, but not all, loan participations occur after origination of the loans. Larger credit unions might participate on a large loan to a commercial member to share the risk. A smaller credit union might

use a participation in order to grant real estate loans or loans over their limit to their members.

Workpapers and References

- Workpapers
  - Liquidity Review Questionnaire (LRQ)
- References
  - NCUA Letters to Credit Unions
    - No. 02-CU-05
    - No. 00-CU-13

INTEREST RATE RISK MEASUREMENT TOOLS – APPENDIX 13A

GAP

A traditional GAP analysis alone does not adequately permit evaluating mortgage-related risks. A repricing GAP represents a measure of the mismatch between the amount of assets and liabilities repricing within a defined time period. It is a simplistic determination of the relative interest rate sensitivity of a balance sheet. GAP analysis can adequately pinpoint large mismatches in assets and liabilities, but lacks as a tool for measuring the complex variables associated with mortgages. GAP does not consider changes in the shape of the yield curve, changes in the spread relationship between different market rates, or option risk (e.g., prepayments). In addition, it does not address the effect of an adverse increase in interest rates on net worth.

Income Simulation

An income simulation model is one means available to simulate the effect on net interest income resulting from (positive and negative) changes in interest rates of 100, 200, and 300 basis points. Typical models use rate shocks to measure the effect on earnings. Income simulation represents an accounting-based earnings approach and can provide useful information for projecting the risk to near-term future earnings and for strategic planning purposes.

Income simulation offers the following improvements over GAP:

- Plots all estimated cash flows;
- Captures actual timing of cash flows; and
- Can accommodate repricing assumptions, amortization assumptions, and yield curve assumptions.

If a credit union limits its ALM analysis to an income simulation model, it should extend the analysis to five years. This provides one way to estimate the effect of embedded options in outlying years. For example, the credit union may own a security that is callable in the second year. If the issuer calls the security, the credit union may have to invest the proceeds at a lower rate; and thus, could cause the

credit union's income to diminish in the second year. The income projection should capture such outlying effects.

However, income simulation makes it difficult to accurately measure the full exposure of prepayment or option risk. In addition, it does not fully address the effect on net worth (value). Income simulation depends highly on assumptions. The longer the time frame, the more these assumptions influence the results. Users must specify what will happen to all the cash flows they receive in future periods. They must incorporate their reinvestment decisions. In short, user bias can increasingly affect the results.

In addition to measuring the short-term effect of interest rate changes on income, it is equally important to measure the long-term effect on capital. Just as changes in interest rates will cause stock and bond prices to fluctuate, changes in interest rates will also affect the fair value of the credit union's balance sheet. As noted earlier, an increase in interest rates will typically cause a credit union's existing loans (and investments) to decline in value. The present value of the balance sheet represents an estimate of the fair value of your credit union's future earnings over the life of the holdings (long-term measure). Credit unions should understand this relationship. NCUA expects credit unions with greater risk to have more sophisticated techniques for quantifying this relationship on their balance sheets. Managing value in relation to risk will increasingly become more important and significant as NCUA implements the system of "prompt corrective action (PCA)," as promulgated by the Credit Union Membership Access Act.

Asset Valuation

For credit unions lacking advanced ALM models, there are additional methods for measuring interest-rate risk in mortgage loans. Using mortgage-backed securities as a proxy, credit unions can obtain estimates of risk exposure on their mortgages. One public source of this information is *The Asset & Liability Price Tables* on the Office of Thrift Supervision Website at http://www.ots.treas.gov/quarter.html. These tables provide mortgage pool security prices at 100, 200, 300 basis point shock scenarios. Industry recognized information providers also provide estimated price sensitivity of individual securities.

Net Economic Value

Net Economic Value (NEV)[1] measures the effect of interest rate risk on capital. NEV represents a solvency measure, but it also estimates the balance sheet's future earnings capacity. It measures the balance sheet's value at a fixed point in time. Proper NEV models capture principal and interest cash flows and provide an analysis of option risk. Managing NEV reduces the volatility of earnings and net worth.

In short, NEV equals the fair value of assets minus the fair value of liabilities. NEV calculations must also include the value of embedded options. Models that calculate NEV compute the value of capital under current interest rates (no rate change) and then under a "shocked" interest rate scenario. The variance between these two NEV calculations represents the potential impact on capital if rates were to change. The components of NEV are as follows:

	Net Economic Value:
A	The value today (present value) of future amounts the credit union will receive such as loan principal and interest payments, and investment principal and interest.
- B	Minus: The value today (present value) of future principal and interest amounts the credit union will pay for its funds.
= C	Equals: Net Economic Value.

To compute the present value one must move backward in time from the future cash flow amounts, using a process called discounting. The concept of discounted cash flows represents a basic financial tool that comprehends the relationship between interest rates and fair value. The discounted cash flow computation serves as the basis for many cash flow comparisons and ALM analyses. Please see Appendix 13B for a basic example of discounting future cash flows.

Both credit unions and examiners should understand that variable-rate assets are not free of interest rate risk. Variable-rate loans or securities may contain lifetime and periodic "caps" that limit their ability to increase (reprice) loan rates. In addition, some interest rate coupon formulas on variable rate loans or securities are contractually

[1] For a more extensive discussion of net economic value and the risk of mortgage-related assets, see the *NCUA Corporate Examiner's Guide* under *Reference* information at NCUA's Website at *http://www.ncua.gov.*

tied to a reference rate that may experience infrequent or unpredictable changes. The modeling of such instruments requires more complex and robust analytical techniques. In all cases, credit unions must employ an ALM methodology commensurate with the risk types and levels assumed.

DISCOUNTING CASH FLOWS – APPENDIX 13B

Discounting Cash Flows Example

The following example demonstrates how a change in interest rates can affect the fair value of a security or loan. **Present value** is the amount of money an individual must invest today to realize a future amount.[1] In other words, it is today's value of the dollar amounts the recipient will receive in the future. Discounting refers to the process of computing a present value. Accordingly, present value represents the discounted value and the interest rate used is often called the discount rate. The price of any financial instrument (e.g., mortgages or investment securities) is the present value of its future cash flows. Understanding the process of discounting cash flows can aid a credit union in valuing its balance sheet and in interpreting the results of its ALM model.

Present value of a future value (cash flow amount) N years from now:

$$\text{Present Value} = \text{Future Value (Cash Flow Amount)} \times \frac{1}{(1+i)^N}$$

i = annual interest or discount rate N = number of years

(See below for formula to accommodate periodic compounding of interest.)[2]

This example applies the formula to a fixed-rate security. It first discounts the cash flows at the coupon rate (7.5%) and then again three hundred basis points higher (10.5%).

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1 This discussion follows, for example, a chapter on Present Value in Fixed Income Mathematics; Third Edition by Frank J. Fabozzi; (Irwin Professional Publishing; 1993); pp. 19-33.

2 Present value of a future value n periods from now assuming periodic compounding:

$$\text{Present Value} = \text{Future Value} \times \frac{1}{(1 + i/m)^{mn}}$$

m = Frequency of compounding (e.g., monthly = 12, semiannually = 2);
i = Periodic interest or discount rate [annual interest rate (in decimal form);
n = Number of periods [number of years].

Discounting Cash Flows Example Amount: $1,000,000 Life: 3 Years Coupon: 7.5% Payments: Annual								
Period	Cash Flow		P/V Formula @ 7.5%	P/V of Cash Flow Disc. @ 7.5%	P/V Formula @ 10.5%	P/V of Cash Flow @ 10.5%	Change in P/V	% Change in P/V
1	75,000		1/(1+.075)1	69,767	1/(1+.105)1	67,873		
2	75,000		1/(1+.075)2	64,900	1/(1+.105)2	61,424		
3	1,075,000		1/(1+.075)3	865,333	1/(1+.105)3	796,749		
Total	1,225,000					926,046	(73,954)	(7.4%)

Note that the present value of the 7.5% coupon bond equates to its face amount of $1,000,000 when the cash flows are discounted at the 7.5% coupon rate. This would equate to a no rate change or base case scenario when computing NEV. However, the present value decreases by about $74,000 when the cash flows are discounted at 10.5%. This would approximate a potential 300 basis point rate shock when computing NEV. The decline in value underscores how an increase in market interest rates can reduce the fair market value of a security or a loan. This diminution also represents potential changes to capital under a NEV rate shock scenario.

While this discounted cash flow example is very basic, it is the fundamental concept behind what an ALM program does to compute NEV. NEV models become more detailed when the user adjusts discount factors for credit, option and liquidity risks.

GLOSSARY OF ALM TERMS - APPENDIX 13C

ALM Definitions

This section defines some terms commonly used in ALM. Standard dictionaries do not contain the definitions of many words and phrases used when discussing ALM; therefore, this glossary may assist the examiner in understanding specialized industry-specific words. (Appendix 12A contains investment terms.)

Basis Risk: the risk to earnings and economic value when a change in one interest rate differs from that of another interest rate for a similar maturity or term. For example, the rate on a money market share account typically changes less than that of an overnight investment account (earning a Federal funds rate.)

Core Share Deposits: in gap analysis, the estimated portion of deposits that are not rate sensitive. Cores share deposits reflect management's judgment of the portion of shares not expected to be withdrawn and reinvested in a higher rate instrument, in response to an increase in market interest rates. Credit unions may consider many regular share accounts with relatively small balances, as well as the portion of share draft accounts reflecting transactional balances, to be core share deposits. Generally, money market share accounts and share certificates are less likely to be considered core share deposits.

Discount Rate: an interest rate used in a model to calculate an estimate of fair value of a financial instrument. A discount rate is used to compute a present value of a cash flow.

Duration of Equity: a simple estimate of the percentage change in fair value net worth for a one percent change in interest rates. See the Investment Chapter for a definition of duration.

Gap Analysis: a simple interest rate risk measurement technique that reports the mismatch between rate sensitive assets (RSAs) and rate sensitive liabilities (RSLs) over a given time period. Common time periods (or gap buckets) are 3 months, 6 months, and 12 months. A gap report typically shows differences between RSAs and RSLs for various gap buckets (i.e., the periodic gaps), and the aggregate difference between RSAs and RSLs up to a specified time period, such as 12 months (i.e., the cumulative gap).

Static gap analysis shows repricing mismatches based on the current balance sheet position. In contrast, *dynamic gap analysis* shows repricing mismatches based on a forecasted balance sheet. Since many credit unions use gap analysis, examiners need to understand its uses and weaknesses. Refer to Appendix 13A for further discussion of gap analysis.

Income Simulation: an interest rate risk measurement technique used to estimate earnings exposure to changes in interest rates. Credit unions use income simulation to forecast Net Interest Income (NII), Net Income (NI), and accounting net worth

under different interest rate scenarios. Refer to Appendix 13A for further discussion of income simulation.

Index: the market interest rate (to which a margin may be added) that is used to reset the interest rate on a variable-rate loan.

Interest Rate Risk (IRR): the risk to a CU's financial condition resulting from adverse changes in interest rates. IRR is a type of market risk. Exposure to IRR can be measured by assessing the effect of changing rates and prices on either the earnings or economic value of an individual instrument, a portfolio, or the entire institution.

Net Economic Value (NEV): an interest rate risk measurement technique used to measure the economic exposure of net worth to changes in interest rates. NEV equals the present value of assets less the present value of liabilities. Refer to Appendix 13A for further discussion of NEV.

NEV Volatility: measures the change (either in dollar or percentage terms) in NEV from a base case resulting from a change in interest rates. A high level of NEV volatility reflects a high level of interest rate risk.

Prepayment: the early repayment of principal, in advance of scheduled amortization or maturity.

Pricing: a credit union management action to set interest rates and terms on loan and deposit products offered to members.

Rate Ramp: is a gradual increase in interest rates over a specified time period, usually 12 months. Rate ramps are used for management forecasts of future earnings in income simulations.

Rate Sensitivity, Rate Sensitive Assets (RSAs), and Rate Sensitive Liabilities (RSLs): in gap analysis, the degree to which a financial instrument is expected to reprice within a given time frame.

For example, given a 12-month time frame for a gap report, a 5-year-remaining-maturity Treasury note is not "rate sensitive" since it will not mature within 12 months. A credit union can estimate prepayments on consumer loans (e.g., 30-year mortgages) to schedule the rate sensitivity of its cash flows. Rate sensitivity assumptions for administered rate liabilities (e.g., regular shares and money market shares) can be very influential on reported gap results.

Rate Shock: is an immediate change in the level of interest rates. Parallel rate shocks of 1 to 3 percent are often used to assess interest rate risk.

Repricing: the change in interest rate resulting from either an *interest rate reset* on a variable-rate or administered-rate instrument, or a *reinvestment of cash flow* from a maturity, scheduled amortization, prepayment, or early withdrawal of an asset or liability.

A variable rate loan reprices on its interest rate change date and on its maturity date, when the principal can be reinvested at a current market interest rate. Repricing also occurs when a credit union administers a rate change on an account such as a money market share account. A fixed rate loan reprices as scheduled

payments occur, upon prepayment of principal, and on its contractual maturity date when any outstanding principal balance is repaid.

Shocked Value: is a fair value for a financial instrument given a rate shock. The difference between the current value and the shocked value informs management of the price sensitivity of a financial instrument to a change in interest rates.

Volatility: can refer to how much change there is in measures of interest rate risk, such as forecasted net income or NEV, across different interest rate scenarios. Volatility also can refer to how much market participants expect interest rates or prices to change in the future.