NCUA LETTER TO CREDIT UNIONS

NATIONAL CREDIT UNION ADMINISTRATION
1775 Duke Street, Alexandria, VA 22314

DATE: August 1999 **LETTER NO.: 99-CU-12**

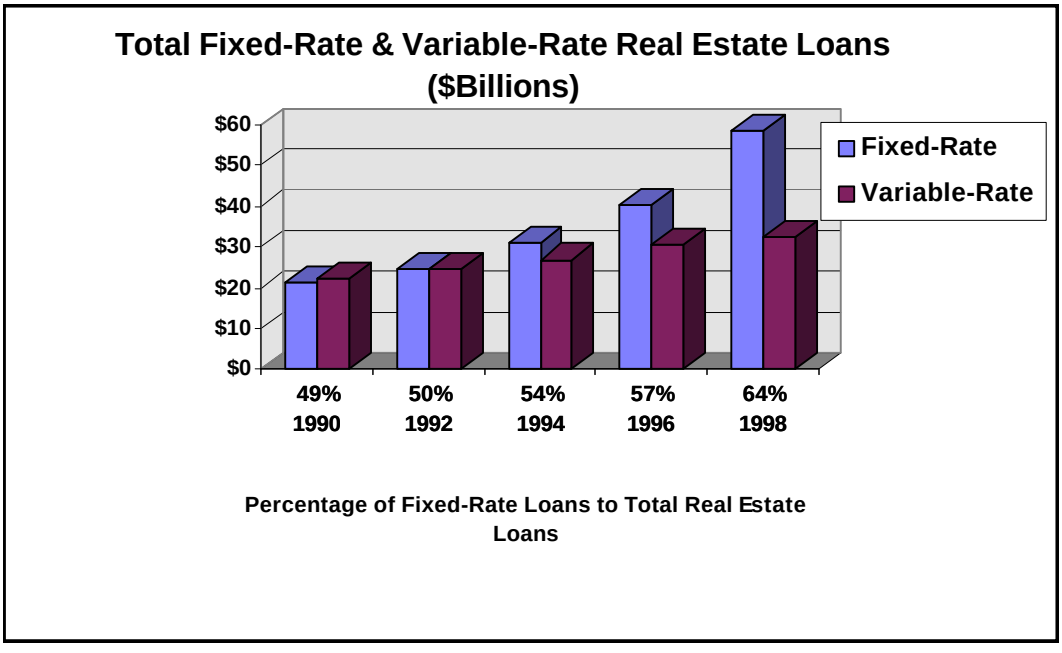
TO: Federally Insured Credit Unions

SUBJ: Real Estate Lending and Balance Sheet Risk Management

This is the first in a series of letters providing guidance on balance sheet risk management. This letter emphasizes the importance of interest rate risk management. Its focus is on mortgage-related assets because they are generally a long-term asset type and also have dynamic cash flow characteristics. This letter augments the real estate lending guidelines outlined by NCUA Letter No. 124.

Mortgage loans are an important loan product for many credit unions to remain competitive in serving their members' needs. NCUA is interested in credit unions' continued ability to provide mortgage lending.

Like other lenders, credit unions actively participated in the waves of refinancing activity in 1998. Many credit union members opted to lock in the lowest mortgage rates in nearly 30 years. Accordingly, most of the new mortgages credit unions granted were fixed-rate. Fixed-rate real estate loans now account for 64% of all real estate loans held by credit unions. This percentage has gradually increased since 1990. The number of credit unions with substantial concentrations in these mortgages is also at a historic high.



While credit unions strive to meet their members' real estate borrowing needs, they must also manage the associated balance sheet risks. We are concerned that some credit unions that either are new to real estate lending or have experienced a rapid increase in real estate loans may not have adequate risk measurement knowledge, systems or methodologies in place to assess and manage their balance sheet risk. These credit unions could impair their future earnings and capital positions.

Real estate lending involves a variety of inherent and **interrelated** risks. Three of the most substantial are interest rate risk, liquidity risk, and credit risk. **NCUA will evaluate the effectiveness of a credit union's risk management process relative to the amount of the credit union's potential balance sheet risk and capacity to absorb such risk.** Below, a brief description of the major balance sheet risks precedes an outline of the interest rate risk management process.

Interest Rate Risk:
The risk that changes in market rates will adversely affect a credit union's profitability and capital.

Credit unions engaging in real estate lending should recognize that changes in interest rates will affect the fair value of their balance sheet. In a rapidly rising interest rate environment, a credit union's cost of shares generally will increase faster than the return it receives on its loans. This can ultimately diminish the credit union's profitability. In addition, as higher yielding loans become readily available, the fair market value of the credit union's existing loans declines. This diminution in value could reduce the credit union's capital.

Credit unions with concentrations of long-term fixed-rate mortgages now face an increased vulnerability to a rising interest rate scenario. The majority of the fixed-rate mortgages credit unions hold are now at near record-low interest rates.

Credit unions also should keep in mind that variable-rate loans are not free of interest rate risk. Variable-rate loans may contain life-time and periodic "caps" that limit their ability to increase (reprice) loan rates. Accordingly, these assets are also subject to reductions in value in a rapidly rising interest rate environment.

Liquidity Risk:
The risk that the credit union will be unable to fund member loan demand and share withdrawals without adversely affecting profitability or capital.

Credit unions engaging in real estate lending should evaluate and gain an understanding of the variability of mortgage cash flows and the corresponding impact on its balance sheet. When interest rates fall, mortgage cash flows increase. When interest rates rise, mortgage cash flows decrease.

For example, as interest rates declined in 1998, many fixed-rate and variable-rate mortgage holders paid the outstanding principal on their existing loans in advance of

their contractual maturities. These prepayments greatly accelerated the cash flows. Credit unions either reinvested this money in securities or refinanced new loans at the lower prevailing rates. This phenomenon is called prepayment risk.

Most borrowers have already refinanced at lower rates. As rates increase, proportionally fewer borrowers will have the market incentive to prepay their loans and refinance. Accordingly, credit unions likely will be amortizing their fixed-rate mortgage loans longer than expected. This will reduce the cash available to loan or reinvest at the higher rates. When the actual rate of prepayments becomes slower than the expected rate and average life therefore increases, it is termed extension risk.

At the same time cash flows are getting smaller in the rising interest rate environment, the fair market value of the asset is also declining. This change in market conditions reduces the amount of cash the credit union can raise through selling these assets or borrowing against them. This could reduce liquidity and solvency. To control risk, it is important that management understand the interrelationships of interest rates, mortgage cash flows, prepayment risk, extension risk, and the effect on the fair value of its assets.

Credit Risk:
The risk that a borrower will default or not repay the principal loan balance.

Historically, NCUA has predicated the main thrust of its examination process on a comprehensive review of credit quality. NCUA examiners will continue to evaluate this area thoroughly. The economic conditions that prevail during a historically high interest rate environment can further weaken some borrowers' ability to repay. Credit unions can be subject to increased credit losses as well as reduced net interest margins. In addition, related credit quality difficulties can swiftly impair both a credit union's balance sheet liquidity and solvency positions.

INTEREST RATE RISK MANAGEMENT:
NCUA will evaluate a credit union's understanding and methodology for measuring interest rate risk relative to the balance sheet risk the credit union has elected to acquire.

An effective risk management process includes:

- policies, procedures, and risk tolerance parameters;
- identification, measurement and reporting of risk exposures; and
- a sound system of internal controls.

Credit unions should identify the risks associated with mortgage-related assets, increase their understanding of these risks and adequately measure them. Each credit union should establish a prudent exposure limit and then routinely evaluate whether its interest rate risk exposure is within policy.

The credit union's interest rate risk management policy should include prudent *balance sheet limits* based on a consolidated measure of the risk characteristics for both loans

and investments. (If the credit union does not have the capability to measure risk on a balance sheet level, prudent *portfolio concentration limits* for loans and investments are an acceptable alternative.) The credit union should include these limits either in their Asset Liability Management (ALM) or investment policy. The policy should specifically indicate the credit union's procedures for managing its interest rate risk and the types of risk analyses management will conduct. **At a minimum, the policy should indicate how much interest rate risk the credit union's balance sheet can accommodate in relation to its capital position.**

As stated in Interpretive Ruling and Policy Statement 98-2[1], it is sound business practice for credit unions to aggregate the interest rate risk measurements of assets that have similar exposures. The credit union should then integrate these measures to obtain an overall risk profile. In short, this means combining the respective risk measures for mortgage-backed investment securities and mortgage loans to obtain an overall balance sheet risk profile.

In order to sufficiently measure, evaluate and report interest rate risk exposure, credit union management should utilize an adequate interest rate risk management system or (ALM) model. NCUA does not advocate any one specific methodology. However, the credit union's methodology should at least reflect the complexity of mortgage-related risks. NCUA expects the level of risk measurement sophistication and management understanding to increase proportional to the amount of balance sheet risk exposure.

Appendix A discusses various methods credit unions have available to measure interest rate risk. Appendix B provides a basic example of discounting future cash flows. This is a valuable concept to understand and apply as it is the basis for much of ALM analysis.

Risk management reports to senior management and the board should summarize the interest rate risk exposure. Management should use these reports to evaluate compliance with policy objectives for interest rate risk tolerance parameters.

As an internal control measure, the credit union's supervisory committee should conduct periodic independent reviews of the interest rate risk management process to ensure the adequacy of policies and compliance with policy limits.

Summary:
NCUA and state credit union supervisors are interested in credit unions' continued ability to service their members' real estate lending needs in a safe and sound manner. Before implementing new strategies, introducing member products, or materially increasing mortgage asset holdings (or any asset type), credit unions should complete a comprehensive balance sheet risk assessment. Prudent interest rate risk management **should be in place now** to avoid excessive risk exposures in the future.

1. IRPS 98-2 Supervisory Policy Statement on Investment Securities and End-User Derivatives Activities discusses in part, the NCUA board's policy on interest rate risk management. IRPS 98-2 is available on NCUA's Website at the following address: *http://www.ncua.gov/ref/IRPS/IRPS.html*.

If you have any questions, please contact your examiner, NCUA regional office, or state supervisory authority, in the case of state chartered credit unions.

Sincerely,

/s/

Norman E. D'Amours
Chairman, NCUA Board

Appendix A
Interest Rate Risk Measurement Methodologies and Mortgage Assets

Depending on its level of potential risk, the credit union should measure:

- The amount of net interest income at risk over future periods, and/or
- The amount of Net Economic Value (discussed below) presently at risk.

The credit union should determine if it can remain profitable and adequately capitalized while holding its respective concentration of fixed-rate mortgages if interest rates increase suddenly by a large amount, such as 300 basis points[2.] If it cannot, will the credit union's capital support the potential loss?

Interest Rate Risk Measurement Techniques:

GAP:
A traditional GAP analysis alone is not adequate for evaluating mortgage-related risks. A repricing GAP is 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 is adequate for pinpointing large mismatches in assets and liabilities, but it is not a good 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 impact of an adverse increase in interest rates on net worth.

Income simulation:
An income simulation model is one means available to simulate the impact 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. It is an *accounting-based* earnings approach. This is 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's ALM analysis is limited to an income simulation model, it should extend the analysis to five years. This provides one way to estimate the impact 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. This could cause the credit union's income to diminish in the second year. It is important to capture such outlying effects in the income projection.

2. An industry standard is to use an instantaneous, parallel, and permanent shift in the yield curve of plus or minus 300 basis points. This measures the effect on net income or capital for a significant change in market rates.

However, it is still difficult to accurately measure the full exposure of prepayment or option risk with income simulation. In addition, it does not fully address the effect on net worth (value). Income simulation is highly dependent upon assumptions. The longer the time frame, the more the results are influenced by these assumptions. 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 your 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 your 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 *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)[3] measures the effect of interest rate risk on capital. NEV is a solvency measure, but is also an estimate of 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

3. 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.*

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** is a basic financial tool that is useful to comprehend the relationship between interest rates and fair value. The discounted cash flow computation is the basis for many cash flow comparisons and ALM analyses. Please see Appendix B for a basic example of discounting future cash flows.

This letter has focused on the risks associated with fixed-rate assets. However, as noted earlier, credit unions also should keep in mind that variable-rate assets are not free of interest rate risk. Variable-rate loans or securities may contain life-time 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 tied to a reference rate that is subject to infrequent or unpredictable change. The modeling of such instruments requires more complex and robust analytical techniques. In all cases, it is important to employ an ALM methodology that is commensurate with the risk types and levels assumed.

Appendix B
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.[4] It is ***today's value*** of the dollar amounts we will receive in the future. The process of computing a *present value* is also referred to as *discounting.* Accordingly, present value is sometimes referred to as 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:

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

i = Annual Interest or Discount Rate

N = Number of Years

(See below for formula to accommodate frequency of receiving future value more than once per year.)[5]

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%).

DISCOUNTING CASH FLOWS-EXAMPLE
Amount: $1,000,000 Life: 3 years
Coupon: 7.5% Payments: Annual

Period	Cash Flow		Present Value Formula @ 7.5%	Present Value of Cash Flow Discounted @ 7.5%	Present Value Formula @ 10.5%	Present Value of Cash Flow Discounted @ 10.5%	Change in Present Value	Percentage Change in Present Value
1	$ 75,000	X	$1/(1+.075)^1$	$ 69,767	$1/(1+.105)^1$	$ 67,873		
2	75,000	X	$1/(1+.075)^2$	64,900	$1/(1+.105)^2$	61,424		
3	1,075,000	X	$1/(1+.075)^3$	865,333	$1/(1+.105)^3$	796,749		
Total	**$1,225,000**			**$ 1,000,000**		**$ 926,046**	**($ 73,954)**	**(7.4%)**

Note that the present value of the 7.5% coupon bond equates to its face amount of

4. 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.

5. Present value of a future value n periods from now:

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

m = Frequency of receipt or payment of the future value.
i = Periodic interest or discount rate [annual interest rate (in decimal form) divided by m];
n = Number of periods [number of years (N) times m];

$1,000,000 when we discount the cash flows 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 we discount the cash flows 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.