Looking Back and Thinking Ahead: Managing Through The Turn In Rates

22nd Annual CUNA CFO Council Conference

May 17th, 2016

Ryan W. Hayhurst - Managing Director, Financial Strategies Group ryan@gobaker.com
800-962-9468
Interest Rate Risk Remains a Top Priority for NCUA in 2016

Supervisory Priorities for 2016

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

DATE: January 2016

TO: Federally Insured Credit Unions

SUBJ: Supervisory Priorities for 2016

Interest Rate Risk

Interest rate risk (IRR) remains a key supervisory focus as interest rates have begun to rise. Rising rates may prove challenging for those credit unions that hold high concentrations of long-term assets funded with short-term liabilities.

NCUA is in the process of updating interest rate risk management supervisory guidance, which will be published in 2016. As part of this effort, NCUA field staff will transition to the updated IRR examination procedures over the course of 2016. The new procedures will improve the efficiency of reviews by focusing field staff resources on those credit unions with elevated levels of IRR and streamlining related exam procedures.

Field staff will receive specialized training on evaluating IRR at the national exam program training in April 2016 and throughout the remainder of the year during regularly scheduled group meetings and other customary training venues. Field staff will evaluate credit unions’ compliance with NCUA’s interest rate risk rule, which requires federally insured credit unions with more than $50 million in assets to develop and adopt a written policy on IRR management, and establish a program to identify, measure, monitor, and control IRR.

Credit union officials should be prepared to provide NCUA field staff with documentation supporting the credit union’s ability to successfully manage their IRR through changing market conditions, including rising rate environments.

For the IRR rule and guidance, see 12 CFR Part 741, Requirements for Insurance and Appendix B to Part 741, Guidance for an Interest Rate Risk Policy and an Effective Program.
NCUA Adding “S” to CAMEL Rating ("S" = Sensitivity to Market Risk, aka IRR)

REVIEW OF NCUA’S INTEREST RATE RISK PROGRAM

Report #OIG-15-11
November 13, 2015

Recommendations:

We recommend that NCUA management:

1. Modify NCUA’s CAMEL Rating System by developing an “S” rating to better capture a credit union’s sensitivity to market risk and to improve interest rate risk clarity and transparency.

2. Revise the current “L” in NCUA’s CAMEL Rating System to reflect only liquidity factors.

Management Response:

Management agreed with both recommendations and committed to submitting a proposal for regulatory change to the NCUA Board by the end of September 2016. Because the process involves regulation changes, reprogramming of multiple data systems, and revisions to examination policies and procedures, management anticipates final implementation by the end of 2018. Management also indicated that implementation of Recommendation 2 will track with the addition of an “S” rating, which will require revisions to the guidance for assigning the “L” component to remove IRR references.

OIG Response:

We agree with management’s planned actions.
Net Interest Change: All IRRM Clients

Net Interest Change - All Institutions on The Baker Group’s Interest Rate Risk Monitor (550)

• Average Net Interest Change for all IRRM Clients:
  - Unchanged Rates = 0.09%
  - +300bps = 2.37%
  - Non-Parallel (+400/+100bps) = 2.31%
    • Note: For non-parallel simulations, cash flow preyps are driven by long-end shift

### Average NIC (+300 bps)

All IRRM Clients - Last 7 Quarters

- Q22014
- Q32014
- Q42014
- Q12015
- Q22015
- Q32015
- Q42015

### Net Int. Change / Net Int. Income

**All IRRM Clients (Unchanged Rates)**

- **Average:** 0.09%
- **Median:** -0.05%
- **Max:** 10.50%
- **Min:** -10.44%
- **StDev:** 1.87%

**NIC / NII (Unchanged)**

### Net Int. Change / Net Int. Income

**All IRRM Clients: +300bps**

- **Average:** 2.37%
- **Median:** 1.80%
- **Max:** 21.90%
- **Min:** -10.07%
- **StDev:** 4.52%

**NIC / NII (+300bps)**
Despite Limited IRR, Some Institutions Still Falling Short on Exams

Common IRR Examination Findings to FDIC & NCUA

- Insufficient evidence of board and senior management discussion of IRR
- Policy limits unrealistic or uninformed
- Use of default (not bank-specific) model assumptions
- Inadequate documentation or support of assumptions
- Lack of (assumption) sensitivity testing
- Lack of 300bp or 400bp interest rate shock scenarios
- Lack of nonparallel yield curve shift scenarios
- Lack of backtesting or backtesting over an insufficient period of time (3 mo. Vs. 12 mo.)
- Need for regular independent reviews
- Independent reviews do not cover all required areas
- Lack of independent review expertise
- Outdated or missing Model Validation
A significant rise in NMS funding raises potential IRR and liquidity concerns if those funds migrate to higher cost sources (e.g. certificates) or disintermediate as rates rise. Regulators want credit unions to simulate a “migration” of NMS to assess the impact on IRR and liquidity. Management should understand the potential impact of this migration to better prepare for the next rate cycle.
Estimating NMS Betas Using Call Report Data
Can be easily generated for any credit union - call to request

Table 1: Dividend & Market Rate Data (Rising Rates: Q4 2003 to Q3 2006)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Share Drafts</td>
<td>0.50%</td>
<td>0.50%</td>
<td>0.50%</td>
<td>0.50%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
<td>1.00%</td>
</tr>
<tr>
<td>Regular Shares</td>
<td>1.29%</td>
<td>1.29%</td>
<td>1.29%</td>
<td>1.30%</td>
<td>1.40%</td>
<td>1.50%</td>
<td>1.70%</td>
<td>1.90%</td>
<td>2.00%</td>
<td>2.20%</td>
<td>2.20%</td>
<td>2.20%</td>
<td>2.20%</td>
</tr>
<tr>
<td>Money Market</td>
<td>1.39%</td>
<td>1.40%</td>
<td>1.40%</td>
<td>1.40%</td>
<td>1.60%</td>
<td>2.00%</td>
<td>2.20%</td>
<td>2.00%</td>
<td>3.15%</td>
<td>4.25%</td>
<td>4.25%</td>
<td>4.25%</td>
<td>4.25%</td>
</tr>
<tr>
<td>Fed Funds</td>
<td>0.94%</td>
<td>1.05%</td>
<td>1.38%</td>
<td>1.94%</td>
<td>1.97%</td>
<td>2.96%</td>
<td>3.35%</td>
<td>3.93%</td>
<td>4.09%</td>
<td>5.00%</td>
<td>5.05%</td>
<td>5.34%</td>
<td>5.34%</td>
</tr>
<tr>
<td>3M UST Yield</td>
<td>0.92%</td>
<td>0.94%</td>
<td>1.27%</td>
<td>1.71%</td>
<td>2.22%</td>
<td>2.77%</td>
<td>3.06%</td>
<td>3.53%</td>
<td>4.20%</td>
<td>4.62%</td>
<td>5.02%</td>
<td>4.95%</td>
<td>4.95%</td>
</tr>
</tbody>
</table>

Table 2: Regression Analysis for Estimating Betas

<table>
<thead>
<tr>
<th></th>
<th>Fed Funds Beta</th>
<th>Fed Funds R-Squared</th>
<th>3Mo Treasury Yield Beta</th>
<th>3Mo Treasury Yield R-Squared</th>
<th>Avg Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share Drafts</td>
<td>14.21%</td>
<td>79.29%</td>
<td>14.60%</td>
<td>76.18%</td>
<td>14%</td>
</tr>
<tr>
<td>Regular Shares</td>
<td>21.61%</td>
<td>89.34%</td>
<td>22.77%</td>
<td>90.33%</td>
<td>22%</td>
</tr>
<tr>
<td>Money Market</td>
<td>61.60%</td>
<td>82.14%</td>
<td>65.03%</td>
<td>83.35%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Regression analysis is a statistical process for estimating the relationship among variables and can be used to develop share betas for IRR software. Table 1 reflects the institution’s share rates along with market rates from 2003 to 2006. Table 2 displays the results of the regression analysis which calculates the degree and strength of the relationship between the institution’s share rates (dependent variable) and changes in market rates (independent variable). Beta measures the degree to which share rates rise when market rates rise and R-Squared measures the “closeness of fit”. An R-Squared closer to 100 indicates a more useful Beta. This analysis assumes historical shares behavior will continue in the future. It is important for institution’s to consider adjustments to these assumptions to reflect the possibility that liabilities may reprice faster than what historical behavior would indicate.

CUNA CFO Council
“Institutions should incorporate “stressed” assumptions for non-maturity deposits in IRR models” ...FFIEC

• Three Ways to Stress NMS Assumptions (Sensitivity Tests)
  1. Ratchet up pricing betas (shift sensitivities) and reduce time lags in order to mimic an aggressively competitive environment for NMD
  2. Reduce Average Life (and Duration) Assumptions in order to assess the EVE impact of lower duration liabilities
  3. Simulate a “migration” of NMS balances into more rate sensitive funding (time deposits or wholesale funding)... considered to be the most realistic depiction of what may happen in the next rate cycle
This institution got 68% of total funding from NMS in 4Q2014 vs. a 25yr average of just 53%. If rates rise and NMS funding reverts to the long-term average, this institution will have to replace funding for 15% of assets from Certificates, Fed Funds or Borrowings. Simulating the impact of this share migration is critical to managing IRR in the next rate cycle.
NMS Migration Case Study

- This institution decided to simulate the impact of NMS funding returning to the 25 year average
- They ran two simulations showing 15% of total assets migrating out of NMS and into higher cost, more rate sensitive liabilities
- For Earnings at Risk simulation, migration occurred over 12 months. For NEV simulation, migration occurred immediately.

**Simulation # 1**
All funds into overnight borrowings at 0.25%

**Simulation # 2**
45% into FHLB 1yr Advances @ 0.60%
33% into FHLB 2yr Advances @ 1.05%
22% into FHLB 3yr Advances @ 1.40%
### NMS Migration Case Study: Earnings at Risk Impact

#### 06/30/2015

**Summary ALCO - Earnings Simulation - 12 Month Horizon**

<table>
<thead>
<tr>
<th>Interest Rate Risk ($'s)</th>
<th>YTD Annualized</th>
<th>Constant Balance Sheet **</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12 Month Horizon in $'s</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Interest Income *</td>
<td>$21,705</td>
<td>$21,640</td>
</tr>
<tr>
<td>Change in Interest Expense</td>
<td>$770</td>
<td>$742</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Immediate</th>
<th>Non-Parallel</th>
<th>Parallel</th>
<th>Unchanged Rate Scenario</th>
<th>Parallel</th>
<th>Parallel</th>
<th>Parallel</th>
<th>Parallel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+400/+300 bp 0 Mo</td>
<td>+400/+100 bp 12 Mo</td>
<td>-100/-100 bp 12 Mo</td>
<td></td>
<td>+100/+100 bp 12 Mo</td>
<td>+200/+200 bp 12 Mo</td>
<td>+300/+300 bp 12 Mo</td>
<td></td>
</tr>
<tr>
<td>NIC as a % of NII</td>
<td>(6.68)</td>
<td>1.32</td>
<td>(0.58)</td>
<td>0.65</td>
<td>1.46</td>
<td>1.81</td>
<td>1.57</td>
<td></td>
</tr>
</tbody>
</table>

#### Simulation # 1 (Overnight Borrowings)

<table>
<thead>
<tr>
<th></th>
<th>Immediate</th>
<th>Non-Parallel</th>
<th>Parallel</th>
<th>Unchanged Rate Scenario</th>
<th>Parallel</th>
<th>Parallel</th>
<th>Parallel</th>
<th>Parallel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+400/+300 bp 0 Mo</td>
<td>+400/+100 bp 12 Mo</td>
<td>-100/-100 bp 12 Mo</td>
<td></td>
<td>+100/+100 bp 12 Mo</td>
<td>+200/+200 bp 12 Mo</td>
<td>+300/+300 bp 12 Mo</td>
<td></td>
</tr>
<tr>
<td>NIC as a % of NII</td>
<td>(14.92)</td>
<td>(2.68)</td>
<td>(0.73)</td>
<td>0.08</td>
<td>(0.09)</td>
<td>(0.61)</td>
<td>(1.56)</td>
<td></td>
</tr>
</tbody>
</table>

#### Simulation # 2 (FHLB Laddered Funding)

<table>
<thead>
<tr>
<th></th>
<th>Immediate</th>
<th>Non-Parallel</th>
<th>Parallel</th>
<th>Unchanged Rate Scenario</th>
<th>Parallel</th>
<th>Parallel</th>
<th>Parallel</th>
<th>Parallel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+400/+300 bp 0 Mo</td>
<td>+400/+100 bp 12 Mo</td>
<td>-100/-100 bp 12 Mo</td>
<td></td>
<td>+100/+100 bp 12 Mo</td>
<td>+200/+200 bp 12 Mo</td>
<td>+300/+300 bp 12 Mo</td>
<td></td>
</tr>
<tr>
<td>NIC as a % of NII</td>
<td>(17.19)</td>
<td>0.33</td>
<td>(3.38)</td>
<td>(2.19)</td>
<td>(1.06)</td>
<td>(0.28)</td>
<td>0.07</td>
<td></td>
</tr>
</tbody>
</table>
Liquidity Risk Management: Then and Now

1995
- Asset-Based Liquidity Management
  - Static Balance Sheet Ratios (Liquidity Ratio)
  - Securities Assumed Liquid & Loans Considered Illiquid
  - Wholesale Lines & Pledging Limited

2016
- Balanced Funds Management Approach
  - Forward-Looking Cash Flow Analysis & Stress Testing
  - Less Liquid Securities & More Saleable Loans
  - Wholesale Lines & Pledging Expanded
Complying with Regulatory Expectations for Liquidity

2010 Interagency Policy Statement on Funding and Liquidity Risk Management

• Investment Price Risk Limits
• Sources & Uses Reporting
• Stress Testing
• Contingency Funding Plans
• Cushion of Highly Liquid, Unencumbered Assets
  o High grade credit quality
  o Easily converted into cash – marketable
    • US Government, Agency (including MBS), or high-grade municipals
    • Stable and predictable cash flows
      o Security selection is critical
      o Beware of too much negative convexity (options risk)
Projected Cashflow Volatility Comparison: Callables vs MBS

Callable Agency Focus
May 2013

MBS/CMO Focus
May 2013

Callable Agency Focus
June 2013

MBS/CMO Focus
June 2013
1. Reduced Mortgage Payments
   ▪ Refinance incentive goes away

2. Reduced Share/Deposit Levels
   ▪ Migration / Disintermediation

3. Increased Loan Demand
   ▪ Local economic activity improves

4. Options Risk (Callable Bonds and MBS/CMOs)
   ▪ Call Options no longer “in-the-money”

5. Reduced Asset Valuations
   ▪ Can no longer painlessly liquidate securities / monetize loans

6. Reduced Borrowing Capacity (Can be related to #5)
   ▪ Increased haircuts / requirements for REPO lines, etc.
## IRRM Sources & Uses

### Starting Cash Balances (Cash & Due & FFS)

<table>
<thead>
<tr>
<th></th>
<th>Apr 16</th>
<th>May 16</th>
<th>Jun 16</th>
<th>Jul 16</th>
<th>Aug 16</th>
<th>Sep 16</th>
<th>Oct 16</th>
<th>Nov 16</th>
<th>Dec 16</th>
<th>Jan 17</th>
<th>Feb 17</th>
<th>Mar 17</th>
<th>12Mo Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
</tr>
</tbody>
</table>

### SOURCES

- **Loan Maturities & Paydowns**
  - Apr 16: 13,235
  - May 16: 9,492
  - Jun 16: 9,000
  - Jul 16: 14,240
  - Aug 16: 10,718
  - Sep 16: 6,780
  - Oct 16: 8,985
  - Nov 16: 9,963
  - Dec 16: 7,621
  - Jan 17: 9,038
  - Feb 17: 5,688
  - Mar 17: 9,370
  - Total: 114,130

- **New Deposits @ 0.00% Ann. Growth**
  - Apr 16: 1,451
  - May 16: 385
  - Jun 16: 1,379
  - Jul 16: 674
  - Aug 16: 829
  - Sep 16: 363
  - Oct 16: 358
  - Nov 16: 353
  - Dec 16: 1,845
  - Jan 17: 343
  - Feb 17: 1,178
  - Mar 17: 1,333
  - Total: 10,491

- **Time Deposit Renewals (100.00%)**
  - Apr 16: 12,405
  - May 16: 4,050
  - Jun 16: 7,349
  - Jul 16: 3,057
  - Aug 16: 3,622
  - Sep 16: 6,911
  - Oct 16: 3,551
  - Nov 16: 2,498
  - Dec 16: 2,620
  - Jan 17: 3,079
  - Feb 17: 2,643
  - Mar 17: 4,599
  - Total: 56,384

### Total Projected Sources of Funds

- Apr 16: 27,091
- May 16: 13,927
- Jun 16: 17,728
- Jul 16: 17,971
- Aug 16: 15,169
- Sep 16: 14,054
- Oct 16: 12,894
- Nov 16: 12,814
- Dec 16: 12,086
- Jan 17: 12,460
- Feb 17: 9,509
- Mar 17: 15,302
- Total: 181,005

### USES

- **Loan Renewals (100.00%)**
  - Apr 16: 13,235
  - May 16: 9,492
  - Jun 16: 9,000
  - Jul 16: 14,240
  - Aug 16: 10,718
  - Sep 16: 6,780
  - Oct 16: 8,985
  - Nov 16: 9,963
  - Dec 16: 7,621
  - Jan 17: 9,038
  - Feb 17: 5,688
  - Mar 17: 9,370
  - Total: 114,130

- **New Loans @ 0.00% Ann. Growth**
  - Apr 16: 1,451
  - May 16: 385
  - Jun 16: 1,379
  - Jul 16: 674
  - Aug 16: 829
  - Sep 16: 363
  - Oct 16: 358
  - Nov 16: 353
  - Dec 16: 1,845
  - Jan 17: 343
  - Feb 17: 1,178
  - Mar 17: 1,333
  - Total: 10,491

- **Investment Purchases (100.00%)**
  - Apr 16: 1,451
  - May 16: 385
  - Jun 16: 1,379
  - Jul 16: 674
  - Aug 16: 829
  - Sep 16: 363
  - Oct 16: 358
  - Nov 16: 353
  - Dec 16: 1,845
  - Jan 17: 343
  - Feb 17: 1,178
  - Mar 17: 1,333
  - Total: 10,491

- **New Securities @ 0.00% Ann. Growth**
  - Apr 16: 1,451
  - May 16: 385
  - Jun 16: 1,379
  - Jul 16: 674
  - Aug 16: 829
  - Sep 16: 363
  - Oct 16: 358
  - Nov 16: 353
  - Dec 16: 1,845
  - Jan 17: 343
  - Feb 17: 1,178
  - Mar 17: 1,333
  - Total: 10,491

- **NMD Runoff @ 0.00% Ann. Rate**
  - Apr 16: 1,451
  - May 16: 385
  - Jun 16: 1,379
  - Jul 16: 674
  - Aug 16: 829
  - Sep 16: 363
  - Oct 16: 358
  - Nov 16: 353
  - Dec 16: 1,845
  - Jan 17: 343
  - Feb 17: 1,178
  - Mar 17: 1,333
  - Total: 10,491

- **Time Deposit Maturities**
  - Apr 16: 12,405
  - May 16: 4,050
  - Jun 16: 7,349
  - Jul 16: 3,057
  - Aug 16: 3,622
  - Sep 16: 6,911
  - Oct 16: 3,551
  - Nov 16: 2,498
  - Dec 16: 2,620
  - Jan 17: 3,079
  - Feb 17: 2,643
  - Mar 17: 4,599
  - Total: 56,384

- **Borrowing Maturities**
  - Apr 16: 12,405
  - May 16: 4,050
  - Jun 16: 7,349
  - Jul 16: 3,057
  - Aug 16: 3,622
  - Sep 16: 6,911
  - Oct 16: 3,551
  - Nov 16: 2,498
  - Dec 16: 2,620
  - Jan 17: 3,079
  - Feb 17: 2,643
  - Mar 17: 4,599
  - Total: 56,384

### Total Projected Uses of Funds

- Apr 16: 27,091
- May 16: 13,927
- Jun 16: 17,728
- Jul 16: 17,971
- Aug 16: 15,169
- Sep 16: 14,054
- Oct 16: 12,894
- Nov 16: 12,814
- Dec 16: 12,086
- Jan 17: 12,460
- Feb 17: 9,509
- Mar 17: 15,302
- Total: 181,005

### Projected Net Monthly Cash Flow

<table>
<thead>
<tr>
<th></th>
<th>Apr 16</th>
<th>May 16</th>
<th>Jun 16</th>
<th>Jul 16</th>
<th>Aug 16</th>
<th>Sep 16</th>
<th>Oct 16</th>
<th>Nov 16</th>
<th>Dec 16</th>
<th>Jan 17</th>
<th>Feb 17</th>
<th>Mar 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ending Cash Balance</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
<td>33,723</td>
</tr>
<tr>
<td>Ending Cash Balance / Total Assets</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Policy Limit</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Within Policy Limit</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
**Stress: Rates +200bp, 5% new deposits, 10% NMD runoff, 10% new loans, 90% CD/Loan renewal**

### IRRM Sources & Uses

<table>
<thead>
<tr>
<th></th>
<th>Apr 16</th>
<th>May 16</th>
<th>Jun 16</th>
<th>Jul 16</th>
<th>Aug 16</th>
<th>Sep 16</th>
<th>Oct 16</th>
<th>Nov 16</th>
<th>Dec 16</th>
<th>Jan 17</th>
<th>Feb 17</th>
<th>Mar 17</th>
<th>12Mo Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting Cash Balances (Cash &amp; Due &amp; FFS)</strong></td>
<td>33,723</td>
<td>30,253</td>
<td>27,250</td>
<td>23,883</td>
<td>21,486</td>
<td>18,680</td>
<td>15,158</td>
<td>12,207</td>
<td>9,463</td>
<td>11,478</td>
<td>11,478</td>
<td>(6,399)</td>
<td>(9,567)</td>
</tr>
<tr>
<td><strong>Loan Maturities &amp; Paydowns</strong></td>
<td>11,996</td>
<td>8,321</td>
<td>7,968</td>
<td>13,382</td>
<td>9,862</td>
<td>5,977</td>
<td>8,341</td>
<td>9,351</td>
<td>7,061</td>
<td>8,605</td>
<td>5,257</td>
<td>9,132</td>
<td>105,253</td>
</tr>
<tr>
<td>Investment Maturities &amp; Prepayments</td>
<td>286</td>
<td>284</td>
<td>281</td>
<td>279</td>
<td>736</td>
<td>274</td>
<td>271</td>
<td>260</td>
<td>438</td>
<td>389</td>
<td>362</td>
<td>1,259</td>
<td>6,073</td>
</tr>
<tr>
<td>New Deposits @ 5.00% Ann. Growth</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>1,743</td>
<td>20,914</td>
</tr>
<tr>
<td>Time Deposit Renewals (90.00%)</td>
<td>11,165</td>
<td>3,645</td>
<td>6,614</td>
<td>2,751</td>
<td>3,260</td>
<td>6,220</td>
<td>3,196</td>
<td>2,248</td>
<td>2,358</td>
<td>2,771</td>
<td>2,379</td>
<td>4,139</td>
<td>50,746</td>
</tr>
<tr>
<td><strong>Plug for Large Deposit Inflows or Other Large inflow</strong></td>
<td>5,000</td>
<td>5,000</td>
<td>10,000</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Projected Sources of Funds</strong></td>
<td>25,189</td>
<td>13,993</td>
<td>16,606</td>
<td>18,155</td>
<td>15,601</td>
<td>14,214</td>
<td>13,551</td>
<td>13,611</td>
<td>15,745</td>
<td>15,508</td>
<td>9,741</td>
<td>16,273</td>
<td>192,986</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
<th><strong>% Adj</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loan Renewals (90.00%)</strong></td>
<td>10,796</td>
<td>7,489</td>
<td>7,171</td>
<td>12,044</td>
<td>8,876</td>
<td>5,379</td>
<td>7,507</td>
<td>8,416</td>
<td>6,355</td>
<td>7,745</td>
<td>4,731</td>
<td>8,219</td>
<td>94,728</td>
</tr>
<tr>
<td><strong>New Loans @ 10.00% Ann. Growth</strong></td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>2,745</td>
<td>32,936</td>
</tr>
<tr>
<td><strong>Investment Purchases (100.00%)</strong></td>
<td>286</td>
<td>284</td>
<td>281</td>
<td>279</td>
<td>736</td>
<td>274</td>
<td>271</td>
<td>260</td>
<td>438</td>
<td>389</td>
<td>362</td>
<td>1,259</td>
<td>6,073</td>
</tr>
<tr>
<td><strong>New Securities @ 0.00% Ann. Growth</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>NMD Runoff @ 10.00% Ann. Rate</strong></td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>2,428</td>
<td>29,132</td>
</tr>
<tr>
<td><strong>Time Deposit Maturities</strong></td>
<td>12,405</td>
<td>4,050</td>
<td>7,349</td>
<td>3,057</td>
<td>3,622</td>
<td>6,911</td>
<td>3,551</td>
<td>2,498</td>
<td>2,320</td>
<td>3,079</td>
<td>2,643</td>
<td>4,599</td>
<td>56,384</td>
</tr>
<tr>
<td><strong>Borrowing Maturities</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Plug for Bond Purchases, New Loans, or Other Large Outflows</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Projected Uses of Funds</strong></td>
<td>28,660</td>
<td>16,995</td>
<td>19,974</td>
<td>20,552</td>
<td>18,406</td>
<td>17,737</td>
<td>16,501</td>
<td>16,355</td>
<td>15,530</td>
<td>36,385</td>
<td>12,909</td>
<td>19,249</td>
<td>239,253</td>
</tr>
</tbody>
</table>

| **Projected Net Monthly Cash Flow** | (3,470) | (3,002) | (3,368) | (2,397) | (2,805) | (3,523) | (2,950) | (2,274) | (5,015) | (17,877) | (3,183) | (2,976) | - |
| **Ending Cash Balance** | 30,253 | 27,250 | 23,883 | 21,486 | 18,680 | 15,158 | 12,207 | 9,463 | 11,478 | (6,399) | (9,567) | (12,544) | - |
| **Ending Cash Balance / Total Assets** | 6.2% | 5.6% | 4.9% | 4.4% | 3.8% | 3.1% | 2.5% | 1.9% | 2.4% | -1.3% | -2.0% | -2.6% | - |
| **Policy Limit** | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | - |
| **Within Policy Limit** | Yes | No | No | No | No | No | No | No | No | No | No | No | - |
| **Available Line of Credit** | - | - | - | - | - | - | - | - | - | - | - | - | - |

### Investment Cash Flows Drop, Callables and MBS Extend
### March 31, 2016

**Credit Union Investment Performance**

**US Credit Unions -- 50-500 Million in Assets**

**Quartile Distribution by Investment Yield**

<table>
<thead>
<tr>
<th></th>
<th>Top Quartile</th>
<th>Average</th>
<th>Bottom Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Yield * **</td>
<td>1.59%</td>
<td>1.12%</td>
<td>0.76%</td>
</tr>
<tr>
<td>**Total Assets ($000) **</td>
<td>186,099</td>
<td>166,946</td>
<td>154,794</td>
</tr>
<tr>
<td>**Inv Securities ($000) **</td>
<td>56,515</td>
<td>41,473</td>
<td>23,124</td>
</tr>
<tr>
<td><strong>Inv in CU's and Banks</strong></td>
<td>11,126</td>
<td>15,411</td>
<td>12,581</td>
</tr>
<tr>
<td><strong>Cash Equiv</strong></td>
<td>13,560</td>
<td>15,880</td>
<td>18,697</td>
</tr>
<tr>
<td><strong>Inv &amp; Cash Equiv/Assets %</strong></td>
<td>43.63%</td>
<td>43.59%</td>
<td>35.14%</td>
</tr>
<tr>
<td><strong>Loans/Assets %</strong></td>
<td>57.34%</td>
<td>60.56%</td>
<td>67.91%</td>
</tr>
<tr>
<td><strong>% AFS</strong></td>
<td>52.85%</td>
<td>33.34%</td>
<td>16.46%</td>
</tr>
<tr>
<td><strong>% Treasury</strong></td>
<td>0.63%</td>
<td>0.81%</td>
<td>0.83%</td>
</tr>
<tr>
<td><strong>% Agency</strong></td>
<td>14.25%</td>
<td>14.90%</td>
<td>11.28%</td>
</tr>
<tr>
<td><strong>% MBS</strong></td>
<td>24.36%</td>
<td>13.54%</td>
<td>3.60%</td>
</tr>
<tr>
<td><strong>% CMO</strong></td>
<td>11.95%</td>
<td>6.08%</td>
<td>0.02%</td>
</tr>
<tr>
<td><strong>% Inv in CU's and Banks</strong></td>
<td>15.88%</td>
<td>26.87%</td>
<td>30.08%</td>
</tr>
<tr>
<td><strong>% Cash Equivalents</strong></td>
<td>19.35%</td>
<td>27.69%</td>
<td>44.71%</td>
</tr>
<tr>
<td><strong>% Other</strong></td>
<td>13.58%</td>
<td>10.12%</td>
<td>9.48%</td>
</tr>
</tbody>
</table>
Mar 2016 Portfolio Summary

All Credit Union Portfolios on Baker Bond Accounting (BBA)

- Avg. Book Yield = 1.70%
- Avg. Life = 3.15 years
- +300bps AvgLife = 3.9 yrs
- +300bps Price Risk = 7.99%

<table>
<thead>
<tr>
<th>Sector Name</th>
<th>Gn / (Ls) %</th>
<th>Yield</th>
<th>Avg life</th>
<th>Eff Dur</th>
<th>Eff Cnvx</th>
<th>% Px Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Acct</td>
<td>Proj</td>
<td>Mrkt</td>
<td>Proj -300</td>
<td>+300</td>
</tr>
<tr>
<td>Treasury</td>
<td>0.80 %</td>
<td>1.36</td>
<td>1.36</td>
<td>1.03</td>
<td>2.67</td>
<td>2.67</td>
</tr>
<tr>
<td>Agency FR</td>
<td>0.32 %</td>
<td>1.85</td>
<td>1.79</td>
<td>1.68</td>
<td>3.11</td>
<td>2.22</td>
</tr>
<tr>
<td>Municipal</td>
<td>0.18 %</td>
<td>1.68</td>
<td>1.68</td>
<td>1.50</td>
<td>7.39</td>
<td>7.39</td>
</tr>
<tr>
<td>Taxable Muni</td>
<td>1.43 %</td>
<td>2.50</td>
<td>2.50</td>
<td>1.98</td>
<td>4.26</td>
<td>4.27</td>
</tr>
<tr>
<td>MBS FR</td>
<td>0.14 %</td>
<td>1.93</td>
<td>1.98</td>
<td>1.92</td>
<td>3.78</td>
<td>2.86</td>
</tr>
<tr>
<td>MBS VR</td>
<td>(1.61)%</td>
<td>0.92</td>
<td>1.10</td>
<td>1.50</td>
<td>4.53</td>
<td>3.49</td>
</tr>
<tr>
<td>CMO FR</td>
<td>(0.30)%</td>
<td>1.87</td>
<td>1.80</td>
<td>1.91</td>
<td>3.26</td>
<td>2.13</td>
</tr>
<tr>
<td>CMO VR</td>
<td>(1.92)%</td>
<td>1.52</td>
<td>2.33</td>
<td>3.41</td>
<td>2.45</td>
<td>1.81</td>
</tr>
<tr>
<td>CDs</td>
<td>0.04 %</td>
<td>1.25</td>
<td>1.25</td>
<td>1.24</td>
<td>1.30</td>
<td>1.29</td>
</tr>
<tr>
<td>Other</td>
<td>0.69 %</td>
<td>2.17</td>
<td>2.17</td>
<td>2.00</td>
<td>3.85</td>
<td>3.85</td>
</tr>
<tr>
<td>APM Totals</td>
<td>(0.11)</td>
<td>1.70</td>
<td>1.74</td>
<td>1.78</td>
<td>3.15</td>
<td>2.40</td>
</tr>
</tbody>
</table>

Sector Allocation

- Agencies: 12.40%
- Treasuries: 0.72%
- Other: 2.34%
- MBS Float: 7.38%
- MBS Fixed: 36.53%
- CDs: 18.62%
- CMO Fixed: 18.43%
Investment Portfolio Management:
Characteristics of High Performance

- **Use The Investment Portfolio To Fight Margin Erosion**
  - The bond portfolio is the only place we can increase margin without hurting the membership

- **Define, Measure & Manage**
  - Define your portfolio objectives & risk tolerance
  - Measure your risk exposure – quality analytics and easy to understand reporting is essential!
  - Manage your risk – actively manage the portfolio in the context of the entire balance sheet

- **Develop a Written Investment Strategy**
  - Build a portfolio, don’t be sold one
  - Be proactive, not reactive with a disciplined investment strategy

- **Diversify The Portfolio Across Sectors and Within Sectors**
  - Each sector has its pros & cons, diversity protects against a range of interest rate scenarios

- **Minimize Cash/CD’s in Favor of Bonds (esp. MBS/CMO)**
  - High performance portfolios tend to own less Cash/CDs/Agencies, more MBS/CMO
  - Bottom quartile portfolios tend to own a lot of Cash/CDs/Agencies

- **Build a Portfolio of Stable, Predictable Cash Flow**
  - Steady, consistent cash flow is the best natural hedge against rising rates
  - Overreliance on volatile cash flows (e.g. callable agencies) will force you to reinvest too much cash flow when rates are low and not enough when rates are high
Many credit unions start with a short ladder of CD’s. This case study institution had a 1.37% yield in 2012. Had they maintained this ladder, their yield today would be about 0.85%. +300bp price volatility = 5%

Instead, this institution wrote an investment strategy and built a diversified portfolio of stable cash flow. Their yield today is 1.59% which is nearly twice as much portfolio income as they would have had with the previous strategy. +300bp price volatility = 7%
Interest Rate Spikes Led to Unrealized Losses

Total Unrealized Gains/Losses in the Credit Union System

30-year conventional mortgage rate (right axis)

NCUA Update
During the 2013 market selloff, Municipals had the greatest amount of price depreciation while CMOs had the least. From peak to trough, Munis fell about 8%, Agencies fell 4.5%, MBS fell 3.75% and CMOs fell about 1.5%
10yr Amortization MBS offer a good shorter duration, fixed rate option for the short end of a cash flow barbell. The characteristics of the 10yr borrower normally produces an MBS with more stable cash flow, minimal prepayment risk and limited extension risk. Lower coupons, less “seasoned” pools and higher average loans sizes are acceptable and should still produce a stable cash flow profile.
When yields rise, higher coupon MBS have historically seen much less price depreciation (and much less overall volatility) than lower coupons. Some institutions avoid higher coupons because of the higher premiums, but that only leads to higher price depreciation when rates rise. Better to buy prepayment protection with higher coupons.
Prepayment Protection Attributes
All of these loan characteristics reduce the risk of prepayment spikes

• Short Amortization
• Low Loan Balance
• Investor/Vacation Properties (NOO)
• High LTV HARP Loans (> 95 LTV)
• Retail Origination Channel (not Third Party, aka TPO)
• Purchase % (vs. Refi %)
• Geographic Concentration – NY, TX
• High Spread at Origination (SATO)
• Servicer (avoid Quicken, focus on big banks)
• GNMA (higher LTV, lower FICO limits refi potential)
Loan Balance is Biggest Influence on Prepayment Volatility

When rates fall and homeowners refinance their mortgages, the size of the loan is the single biggest determinant of how quickly and how often refinancings occur. The chart above shows the historical 1mo CPR of FNMA 30yr 4% MBS issued in 2010. The blue line is the average of all those type of MBS, the grey line is only the jumbo loans and the red line is only those loans < $85,000. Clearly LLB MBS have the least prepayment volatility.
Stable prepayments means stable yield/income. The chart above shows the historical yield of those same FNMA 30yr 4% MBS issued in 2010. This analysis assumes the Cohort (blue line) was purchased at 106, the LLB (red) at 107 and the Jumbos at 105. Even though you are paying an even larger premium for the LLB and a lower premium for the Jumbos, your yield/income on the LLBs is significantly more stable and nearly always higher.
Loans Serviced By Quicken Experience Significant Call Risk
CMOs offer many more options than “pass-through” MBS.
In this case, a low coupon CMO was created from higher coupon MBS. The result is an investment with a lower premium (100-25) than the underlying collateral would have (107-24). This CMO also has a shorter average life (3.7yrs vs. 5.5yrs) than the underlying collateral and less extension risk (0.8yrs vs. 4.2yrs). The result is a low premium investment, with good yield spread, stable cashflows and limited price depreciation.

**High WAC, Low Coupon CMO**

<table>
<thead>
<tr>
<th>Settlement Date</th>
<th>3/31/2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>100-25</td>
</tr>
</tbody>
</table>

### Scenario Yield Analysis

<table>
<thead>
<tr>
<th>Rate Shift (bps)</th>
<th>+300</th>
<th>+200</th>
<th>+100</th>
<th>0</th>
<th>-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPR</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Yield to Maturity</td>
<td>1.79</td>
<td>1.77</td>
<td>1.75</td>
<td>1.75</td>
<td>1.73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rate Shift (bps)</th>
<th>+300</th>
<th>+200</th>
<th>+100</th>
<th>0</th>
<th>-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread to Tsy</td>
<td>+51</td>
<td>+56</td>
<td>+59</td>
<td>+60</td>
<td>+63</td>
</tr>
</tbody>
</table>

### Historical Yield Analysis

<table>
<thead>
<tr>
<th>Yield to Maturity</th>
<th>1.75</th>
<th>1.75</th>
<th>1.75</th>
<th>1.75</th>
<th>1.76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg Life</td>
<td>3.74</td>
<td>3.74</td>
<td>3.74</td>
<td>3.74</td>
<td>3.83</td>
</tr>
<tr>
<td>Duration</td>
<td>3.54</td>
<td>3.54</td>
<td>3.54</td>
<td>3.54</td>
<td>3.62</td>
</tr>
<tr>
<td>Spread to Tsy</td>
<td>+60</td>
<td>+60</td>
<td>+60</td>
<td>+60</td>
<td>+59</td>
</tr>
</tbody>
</table>

### Price Volatility Analysis

(Source: Bloomberg)

<table>
<thead>
<tr>
<th>bps</th>
<th>CPR</th>
<th>Mkt Yield</th>
<th>Avg Life</th>
<th>Price</th>
<th>Px Chg</th>
</tr>
</thead>
<tbody>
<tr>
<td>-300</td>
<td>23</td>
<td>0.05</td>
<td>2.74</td>
<td>105.19</td>
<td>+4.4%</td>
</tr>
<tr>
<td>-200</td>
<td>22</td>
<td>0.05</td>
<td>2.86</td>
<td>105.43</td>
<td>+4.6%</td>
</tr>
<tr>
<td>-100</td>
<td>18</td>
<td>0.73</td>
<td>3.42</td>
<td>104.13</td>
<td>+3.3%</td>
</tr>
<tr>
<td>0</td>
<td>12</td>
<td>1.75</td>
<td>3.74</td>
<td>100.78</td>
<td></td>
</tr>
<tr>
<td>+100</td>
<td>9</td>
<td>2.75</td>
<td>3.79</td>
<td>97.27</td>
<td>-3.5%</td>
</tr>
<tr>
<td>+200</td>
<td>8</td>
<td>3.77</td>
<td>4.11</td>
<td>93.43</td>
<td>-7.3%</td>
</tr>
<tr>
<td>+300</td>
<td>7</td>
<td>4.80</td>
<td>4.53</td>
<td>89.12</td>
<td>-11.6%</td>
</tr>
</tbody>
</table>

### Annual Principal Cashflow Projection @ 12 CPR ($1mm CF)

- 18 CPR -100bps
- 12 CPR unch’d
- 9 CPR +100bps
Flatter Yield Curve Makes ARMs More Attractive

A flatter yield curve makes ARMs a more attractive option today than in prior years. The 1-year part of the curve (where many ARMs are indexed) has risen 40bp+ since 2013 while the 5-10yr part of the curve (where many fixed MBS are priced) has fallen 40-120bp. This combined with tighter spreads has significantly reduced the “yield give-up” for buying ARMs over Fixed Rate MBS.
1-Year LIBOR has doubled since 2014 and 1-Year CMT is up 5 fold! LIBOR is consistently higher than CMT and has more “stickiness” during rate rallies. Rising short-term rates, a flatter yield curve and tight mortgage spreads make ARMs an attractive alternative to 10yr and Seasoned 15yr fixed rate MBS.
FN/FH Annual ARMs based on 1Yr LIBOR or 1yr CMT offer better yields than several months ago and provide a decent option if an institution needs true rate sensitivity. Premium are higher than on lower coupon Hybrids and prepayment volatility creates the potential for yield volatility, but well seasoned pools provide reasonable stability and depreciation potential is limited.
Managing Your Balance Sheet Through The Turn in Rates

• Review Your Entire IRR & ALCO Process
  – Prepare for your next exam – board education, validation, stress testing, NMS analysis, sensitivity testing, surge balance analysis, etc.

• Make Your IRR Assumptions Institution Specific & Simulate Migration
  – Analyze your NMS to determine sensitivities/betas
  – Run an open/close study to determine average lives
  – Run an NMS Surge Balance Analysis and simulate impact of NMS migration

• Ensure Your Liquidity Management System Is Forward Looking & Dynamic
  – IRR and Liquidity Risk are closely related – how will your liquidity hold up when rates rise?

• Use The Investment Portfolio To Fight Margin Erosion
  – The bond portfolio is the only place we can increase margin without hurting the membership

• Don’t Be Complacent!
  – Fed rate hikes expected to be slowest on record – FF futures don’t reach 1% before 2018
  – Stay fully invested and buy the curve while limiting extension to take advantage of steep curve

• Build a High Performance Investment Portfolio
  – Minimize Cash, CD’s & Callable Agencies and favor MBS/CMOs with the right loan attributes
  – Higher coupon 10-15yr MBS, PAC CMOs, Post-Reset ARMs, < 5yr maturity Agencies/CDs
  – Buy MBS/CMO with prepayment protection attributes - LLB, Investor, NY/NJ/TX/PR, retail, etc.

• Build a Portfolio of Stable, Predictable Cash Flow
  – There is no better hedge against rising rates than a portfolio of stable cash flow for reinvestment