Balance Sheet Strategies For Changing Rate Environments

Moss Adams 2017 Credit Union Conference

Portland, OR
June 22nd, 2017

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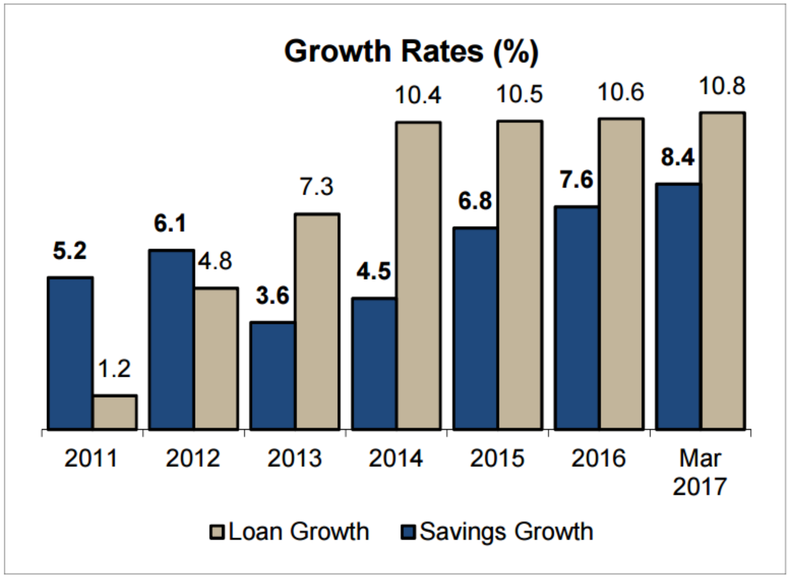
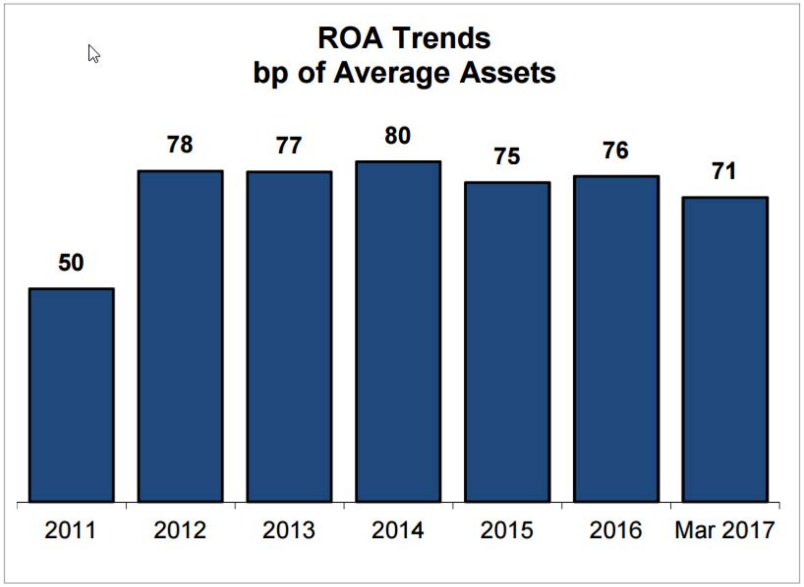
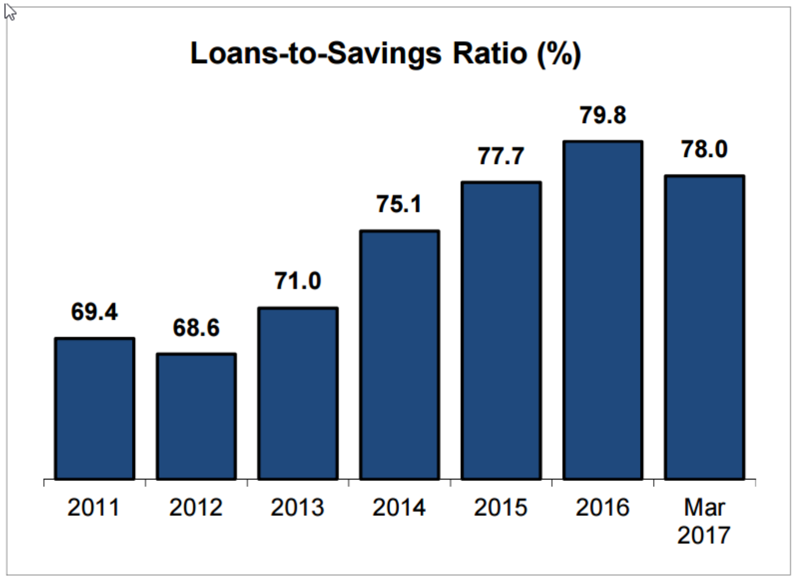
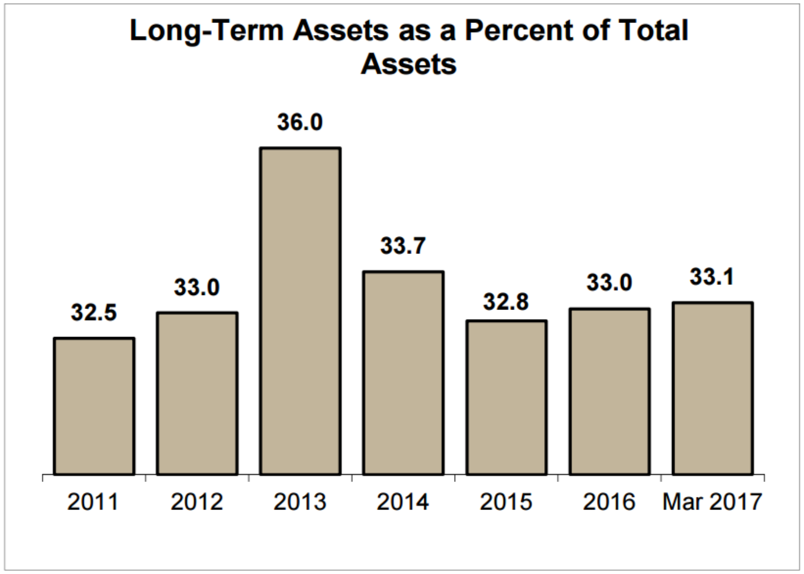
Credit Union Industry Trends



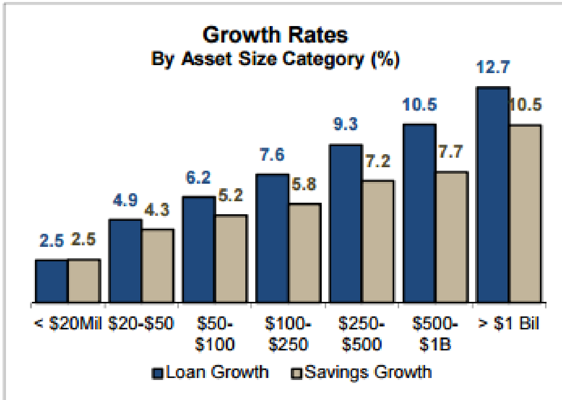




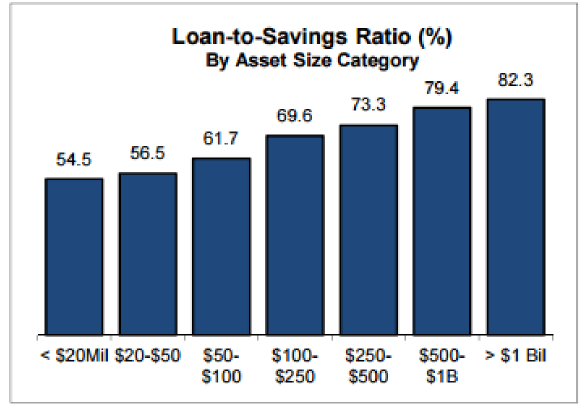


The BakerGroup

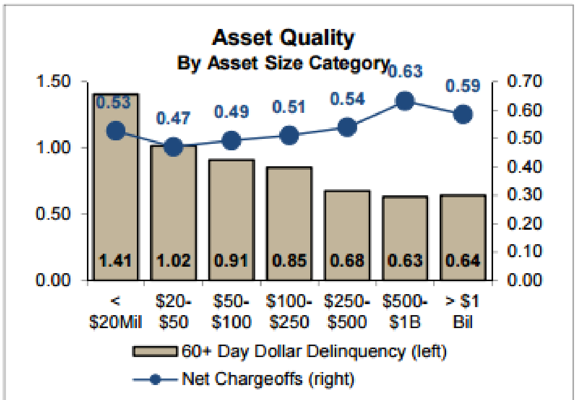
Loan and Savings growth



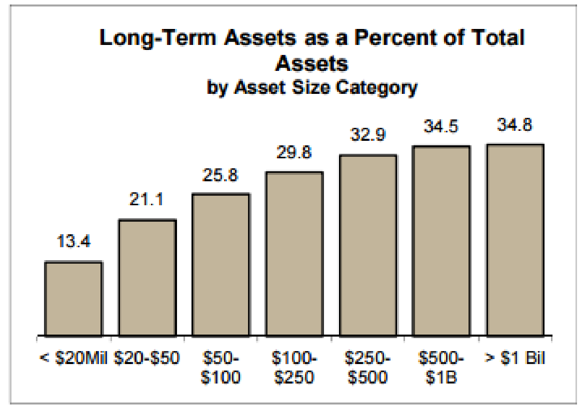
Liquidity Risk Exposure



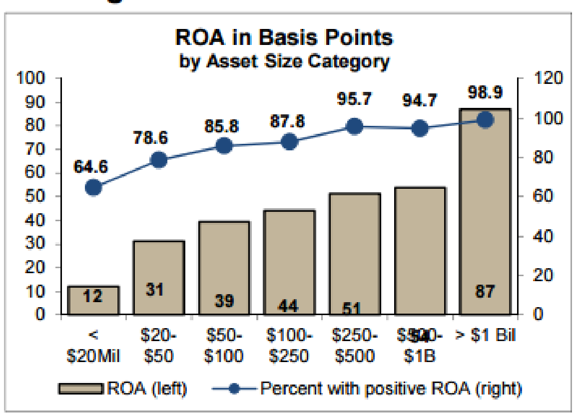
Credit Risk Exposure



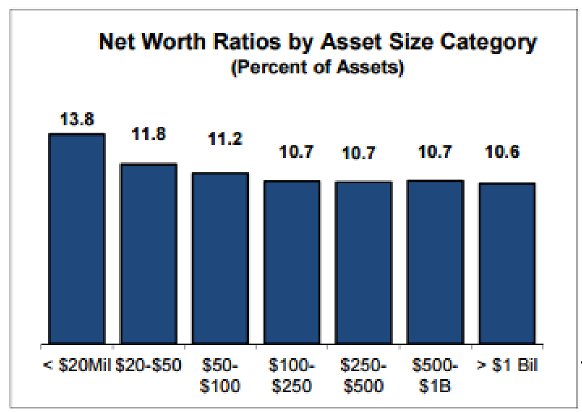
Interest Rate Risk Exposure



Earnings



Solvency



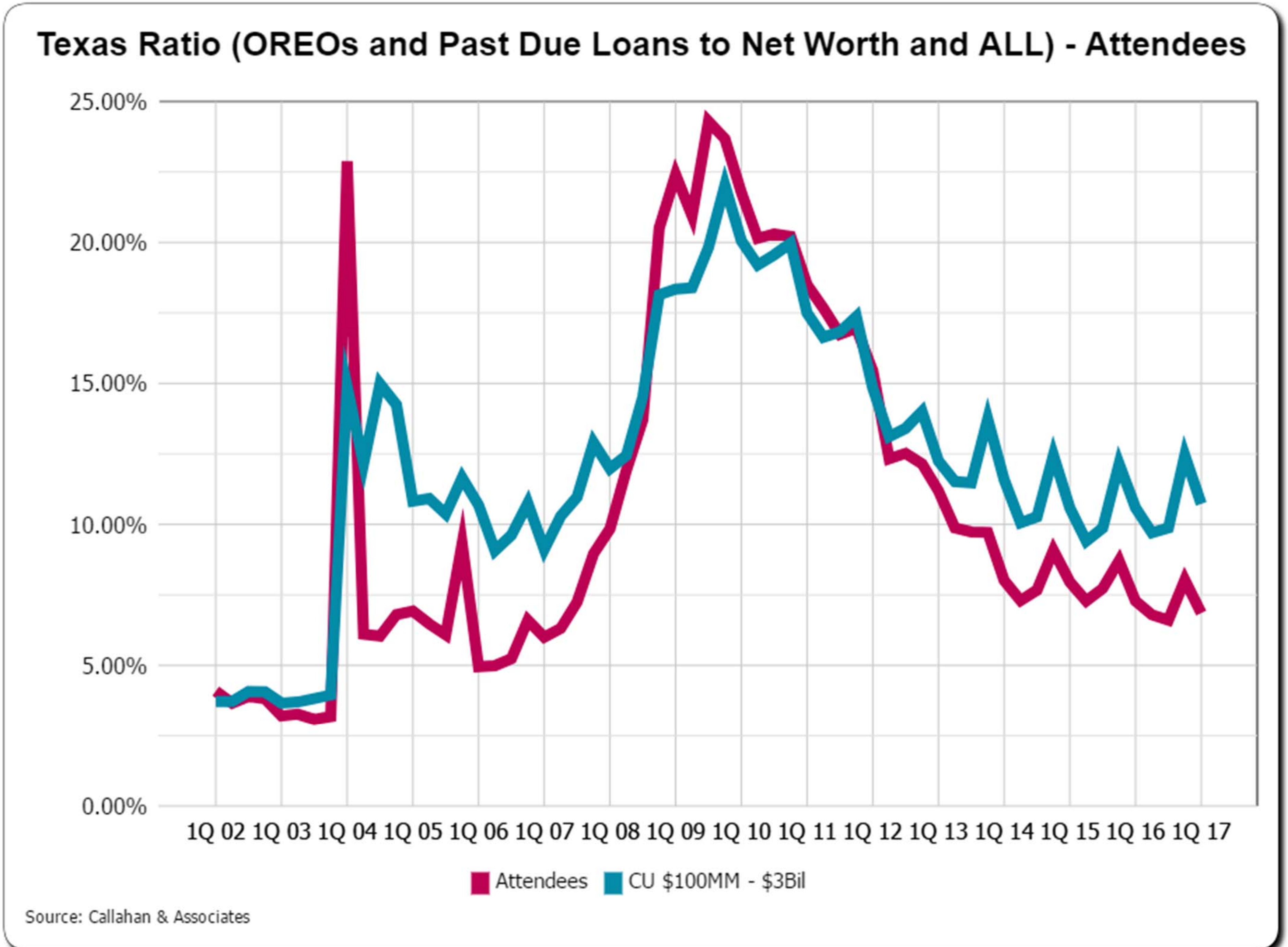
Regulatory Focus in2017

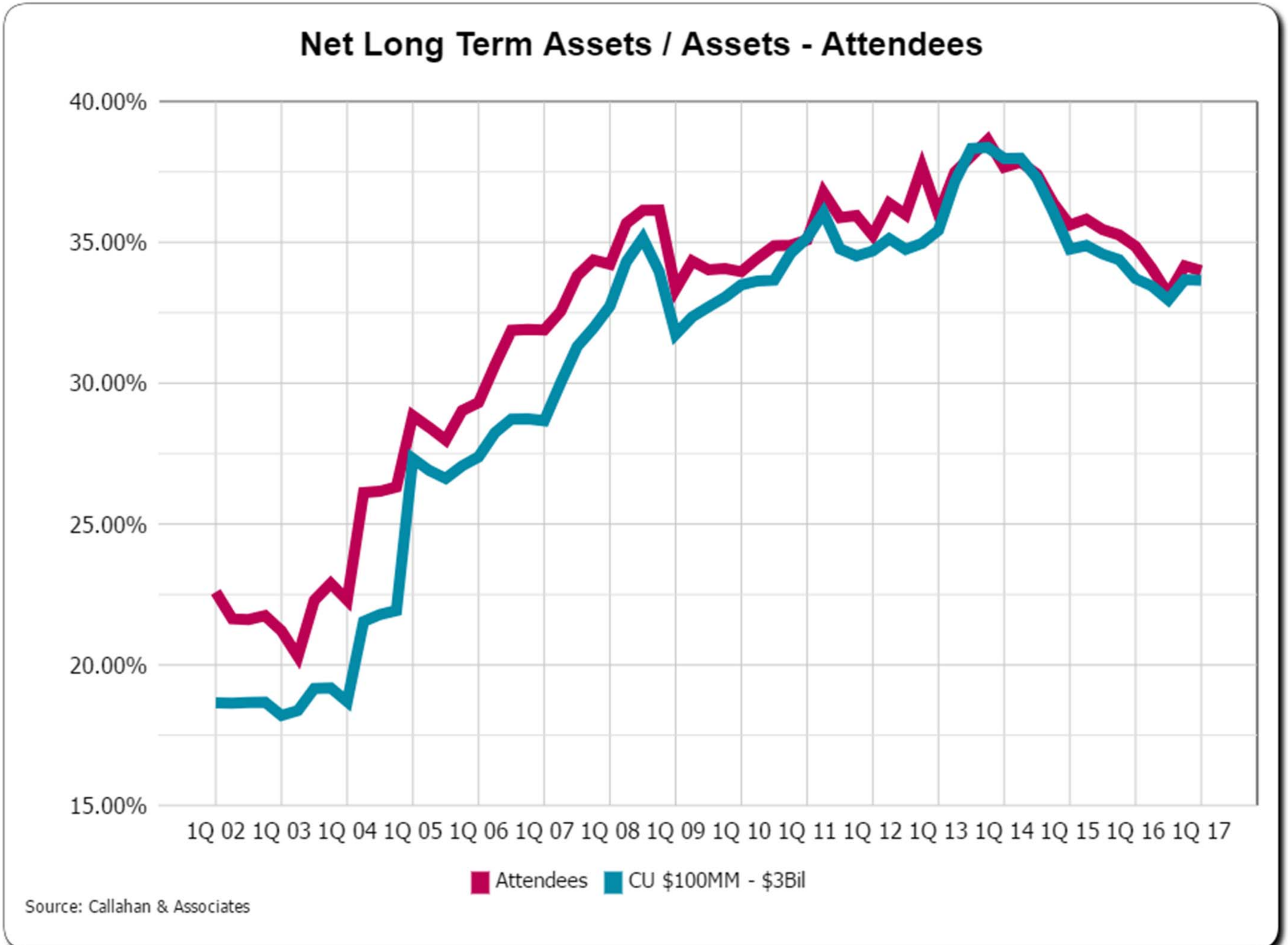
- Credit Risk
  - Credit risk increasing because of strong loan growth combined with easing in underwriting standards
  - Examiner surveys showing an easing in underwriting standards
  - CRE concentration to get extra exam scrutiny this year

- Cybersecurity
  - Will this ever go away? (Hint: The Answer is No!)
  - FDIC has new IT Technology Risk Examination Program (June 2016)
  - FFIEC released Cybersecurity Assessment Tool (July 2015)

- Liquidity Risk Management
  - Rising L/D Ratios and falling Liquidity Ratios move Liquidity Risk up the priority list
  - Do we have good risk management systems in place to measure and monitor our liquidity levels?
  - Forward Looking & Dynamic Liquidity Modeling (Stress Testing!!)

- Interest Rate Risk
  - Moved down the priority list last year or so, but with the recent move in the yield curve and the likelihood of more 2017 rate hikes, it will likely remain a high regulatory focus.
  - Potential for NMD migration a particular concern for regulators


Texas Ratio (OREOs and Past Due Loans to Net Worth and ALL) - Attendees
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1Q 02 1Q 03 1Q 04 1Q 05 1Q 06 1Q 07 1Q 08 1Q 09 1Q 10 1Q 11 1Q 12 1Q 13 1Q 14 1Q 15 1Q 16 1Q 17
Attendees
CU $100MM - $3Bil
Source: Callahan & Associates



Net Long Term Assets / Assets - Attendees
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
1Q 02
1Q 03
1Q 04
1Q 05
1Q 06
1Q 07
1Q 08
1Q 09
1Q 10
1Q 11
1Q 12
1Q 13
1Q 14
1Q 15
1Q 16
1Q 17
Attendees
CU $100MM - $3Bil
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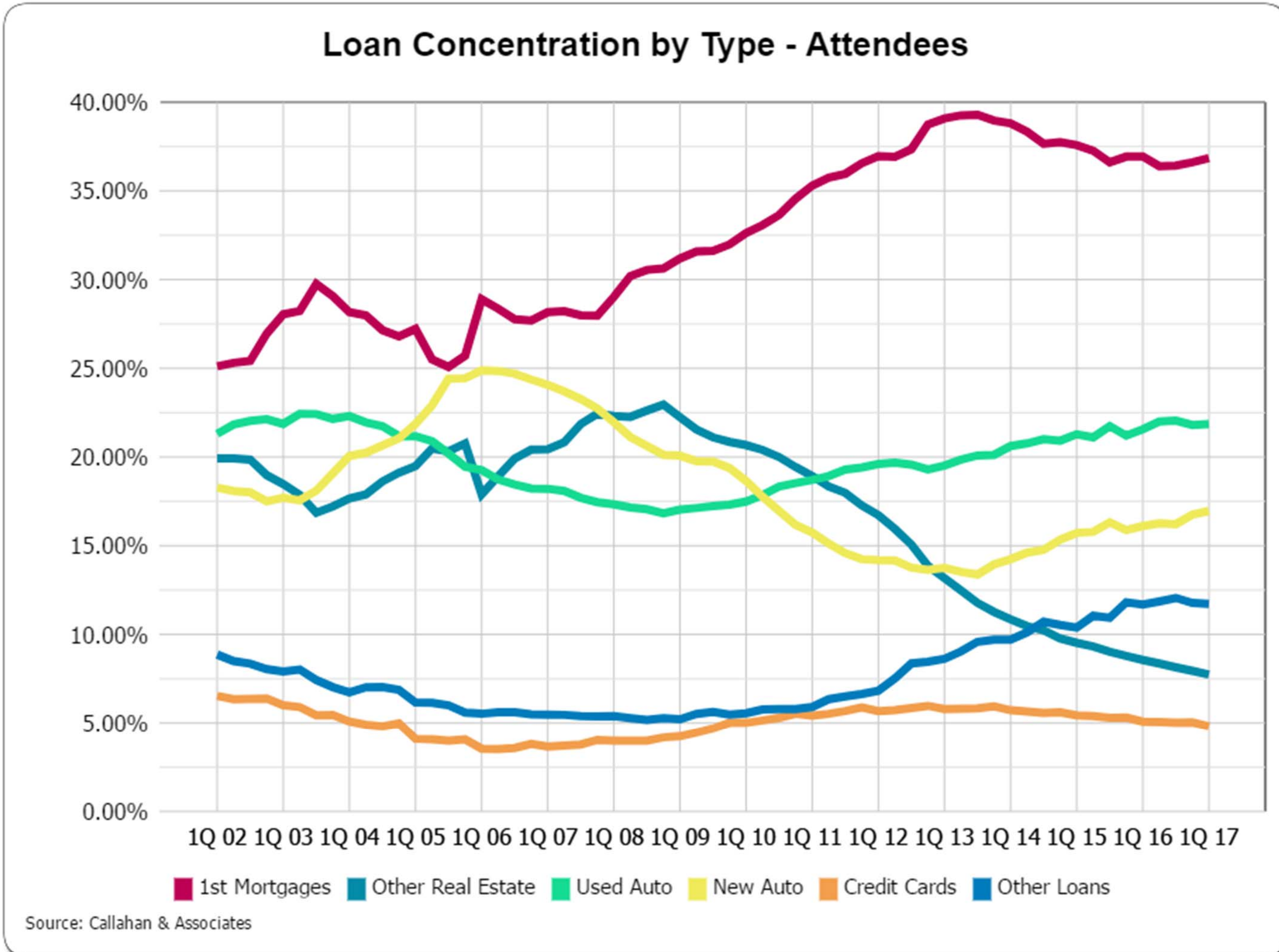
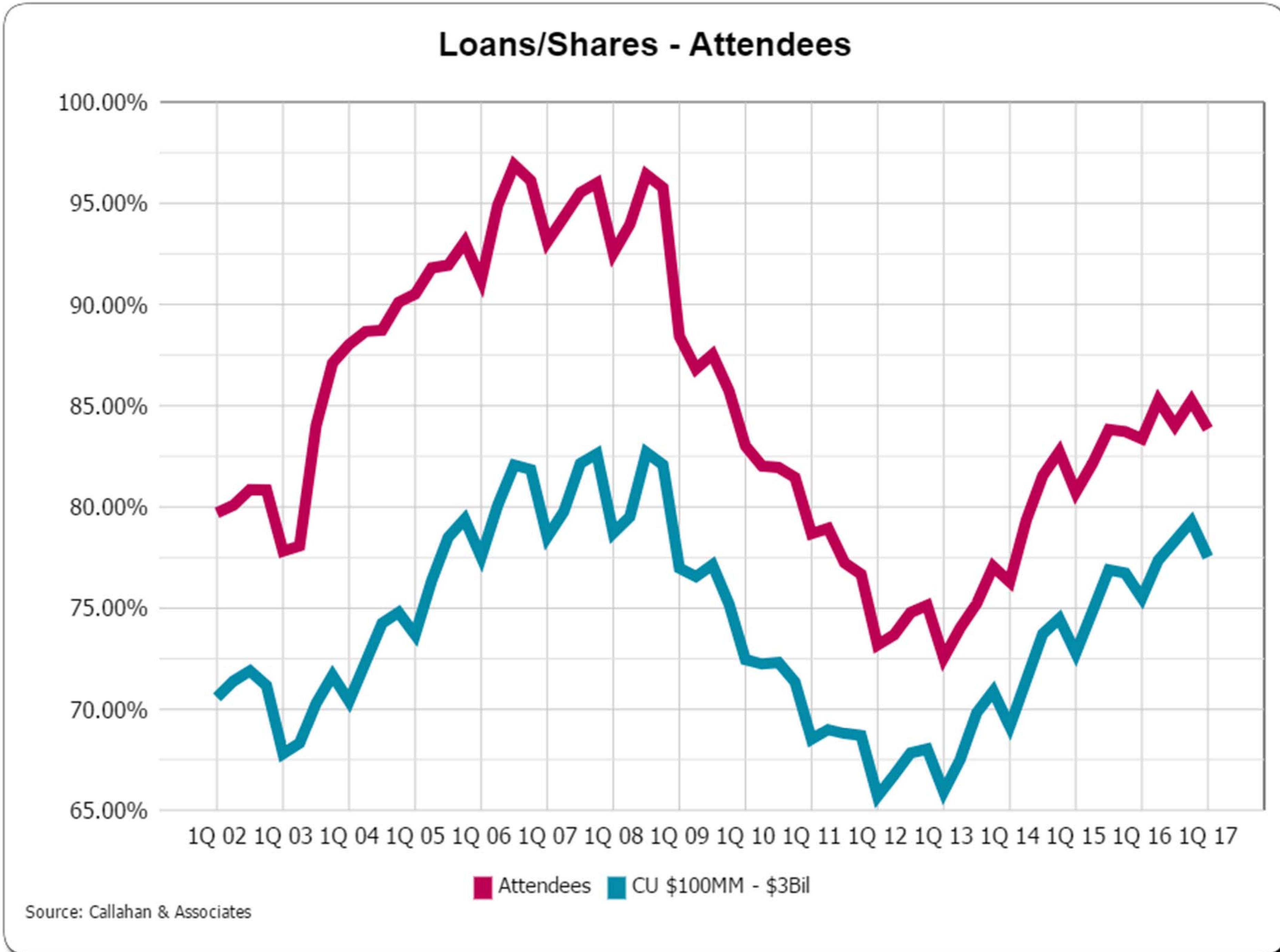
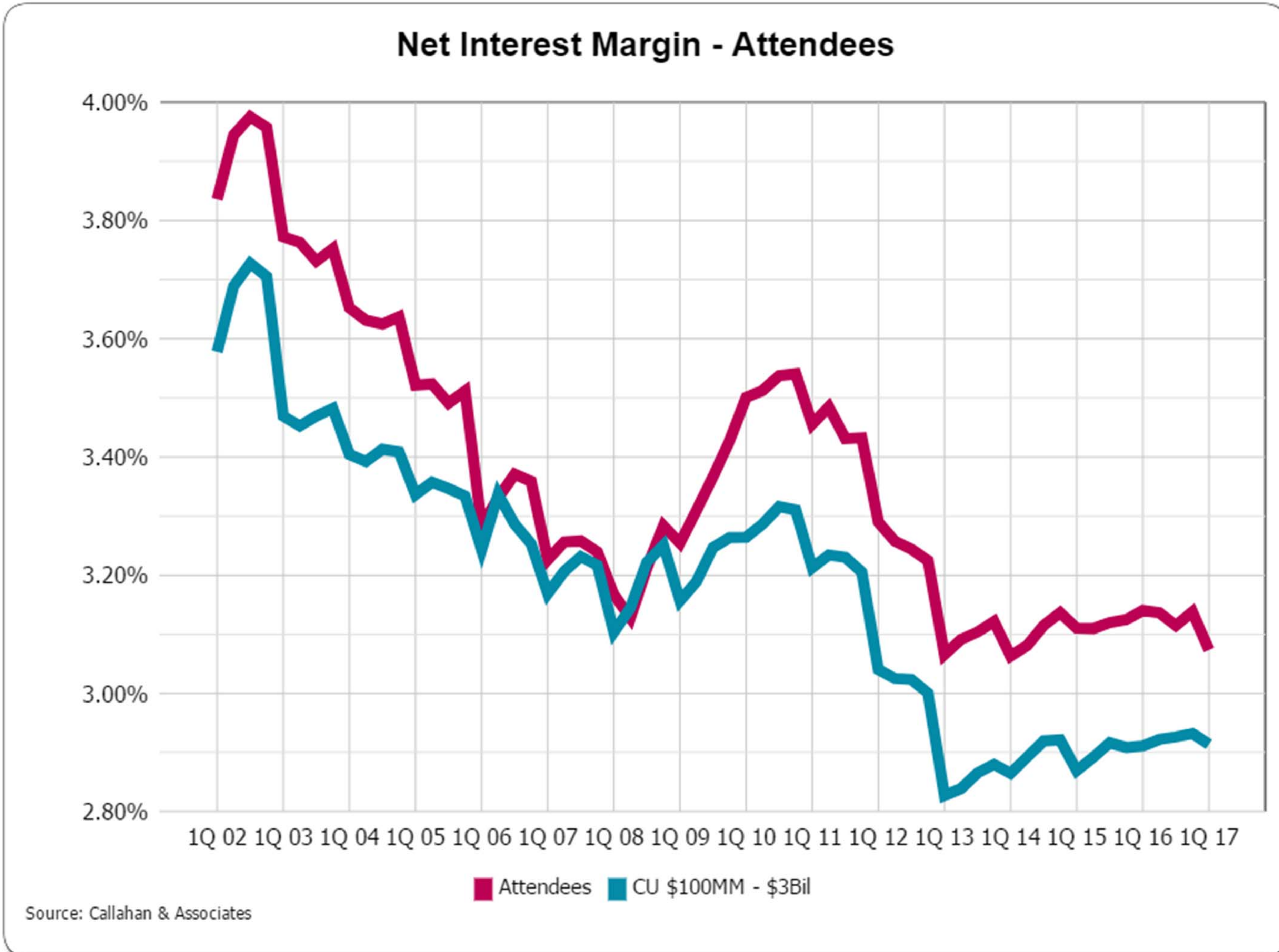

Loan Concentration by Type - Attendees
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1Q 02 1Q 03 1Q 04 1Q 05 1Q 06 1Q 07 1Q 08 1Q 09 1Q 10 1Q 11 1Q 12 1Q 13 1Q 14 1Q 15 1Q 16 1Q 17
1st Mortgages
Other Real Estate
Used Auto
New Auto
Credit Cards
Other Loans
Source: Callahan & Associates



Loans/Shares - Attendees
100.00%
95.00%
90.00%
85.00%
80.00%
75.00%
70.00%
65.00%
1Q 02 1Q 03 1Q 04 1Q 05 1Q 06 1Q 07 1Q 08 1Q 09 1Q 10 1Q 11 1Q 12 1Q 13 1Q 14 1Q 15 1Q 16 1Q 17
Attendees
CU $100MM - $3Bil
Source: Callahan & Associates


Net Interest Margin - Attendees
4.00%
3.80%
3.60%
3.40%
3.20%
3.00%
2.80%
1Q 02
1Q 03
1Q 04
1Q 05
1Q 06
1Q 07
1Q 08
1Q 09
1Q 10
1Q 11
1Q 12
1Q 13
1Q 14
1Q 15
1Q 16
1Q 17
Attendees
CU $100MM - $3Bil
Source: Callahan & Associates

Regulatory Focus: Liquidity Risk Management

- IRR & Liquidity Risk Are Closely Related
- Less Liquidity in the Banking System Due to Higher Loan Demand
- Focus on Measuring, Monitoring and Reporting Systems
- Forward Looking & Dynamic Sources & Uses
- Dynamic Cash Flow Analysis
- Stress Testing
- Contingency Funding Planning
- Diversified Funding
- Cushion of liquid assets (marketable investments)

Funding and Liquidity Risk Management Interagency Guidance

The Liquidity Regulatory Guidance is not new, however, there seems to be more focus on Liquidity Risk Management during recent examinations.

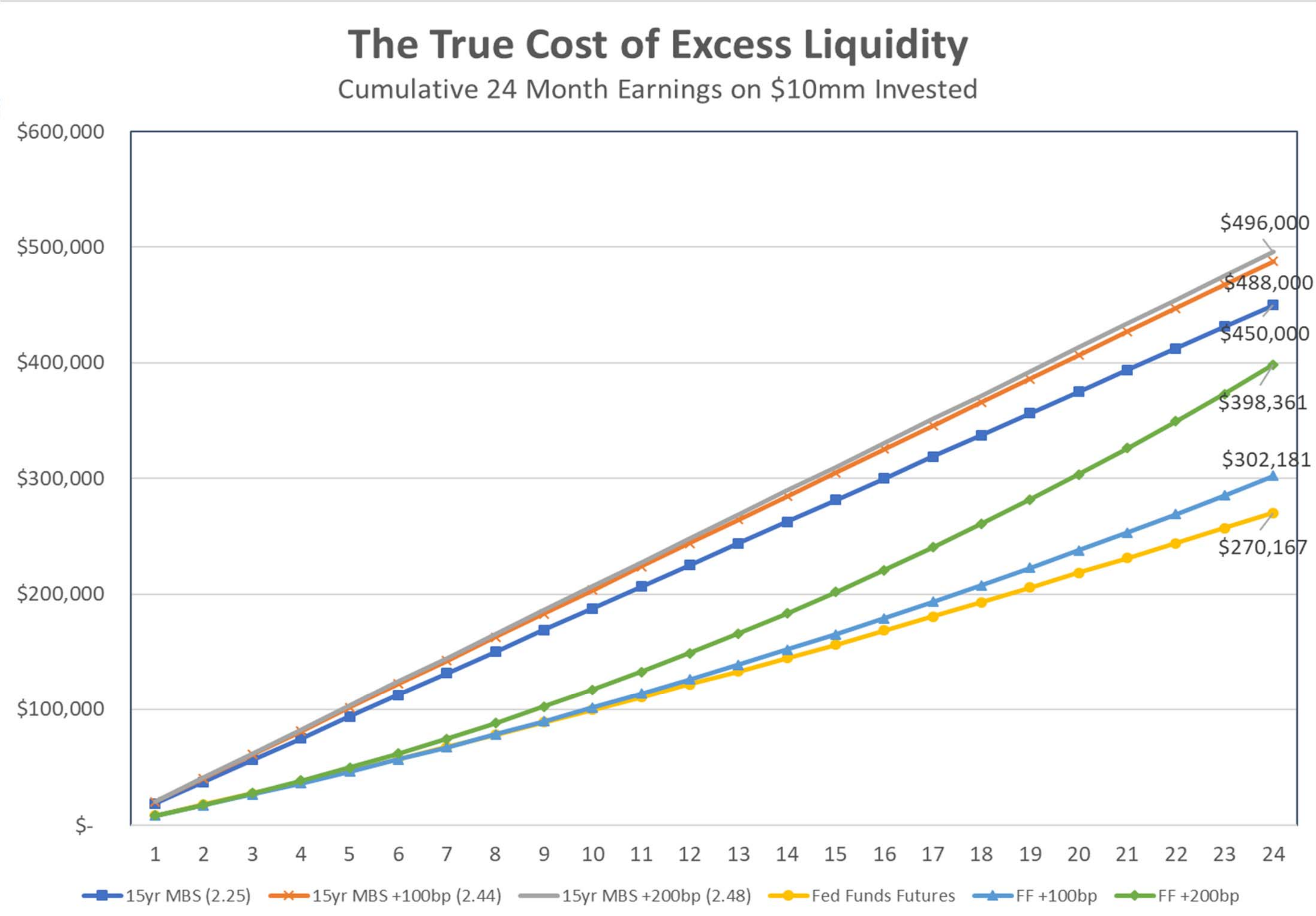
FIL-13-2010
April 5, 2010

Summary: The federal banking agencies and the National Credit Union Administration (collectively, the agencies) recently issued guidance to provide sound practices for managing funding and liquidity risk and strengthening liquidity risk management practices. The policy statement emphasizes the importance of cash flow projections, diversified funding sources, stress testing, a cushion of liquid assets and a formal, well-developed contingency funding plan as primary tools for measuring and managing liquidity risk. The agencies expect each financial institution to manage funding and liquidity risk using processes and systems that are commensurate with the institution's complexity, risk profile and scope of operations.

What Are Considered Liquid Assets?

- On-Balance Sheet Liquid Assets:
  - o Cash on Hand
  - o Cash on Deposit in Banks & CUs
  - o Cash Equivalents (<3mo, FFS, CD's)
  - o Highly Liquid/Readily Marketable Securities

US Credit Unions $100mm - $3 Billion	
Total Assets	$332mm
Cash & Cash Equiv	$45mm
Investment Portfolio	$96mm



The True Cost of Excess Liquidity
Cumulative 24 Month Earnings on $10mm Invested
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$-
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
$496,000
$488,000
$450,000
$398,361
$302,181
$270,167
15yr MBS (2.25)
15yr MBS +100bp (2.44)
15yr MBS +200bp (2.48)
Fed Funds Futures
FF +100bp
FF +200bp

March 31, 2017
Credit Union Investment Performance
US Credit Unions -- 50-500 Million in Assets
Quartile Distribution by Investment Yield

	Top Quartile	Average	Bottom Quartile
Yield *	1.64%	1.21%	0.87%
Total Assets ($000)	200,584	177,245	166,531
Inv Securities ($000)	56,666	41,641	21,570
Inv in CU's and Banks	11,445	15,120	11,161
Cash Equiv	14,252	17,089	19,890
Inv & Cash Equiv/Assets %	41.06%	41.67%	31.60%
Loans/Assets %	59.62%	61.79%	69.81%
% AFS	54.58%	34.29%	19.12%
% Treasury	0.63%	0.85%	0.98%
% Agency	11.97%	13.73%	10.40%
% MBS	26.17%	14.30%	3.77%
% CMO	11.48%	6.11%	1.85%
% Inv in CU's and Banks	16.14%	25.74%	26.92%
% Cash Equivalents	20.10%	29.10%	47.97%
% Other	13.51%	10.16%	8.11%

March 31, 2017
Credit Union Investment Performance
US Credit Unions -- 500 Million - 1 Billion in Assets
Quartile Distribution by Investment Yield

	Top Quartile	Average	Bottom Quartile
Yield *	1.96%	1.33%	0.88%
Total Assets ($000)	854,548	814,622	790,968
Inv Securities ($000)	189,932	148,553	66,359
Inv in CU's and Banks	8,513	12,147	9,417
Cash Equiv	54,817	77,353	92,051
Inv & Cash Equiv/Assets %	29.64%	29.22%	21.22%
Loans/Assets %	66.44%	67.20%	75.03%
% AFS	75.32%	67.19%	49.71%
% Treasury	1.12%	1.87%	1.77%
% Agency	16.04%	20.97%	21.83%
% MBS	28.20%	20.15%	5.46%
% CMO	16.17%	10.58%	2.35%
% Inv in CU's and Banks	3.48%	5.38%	5.94%
% Cash Equivalents	22.40%	34.24%	58.11%
% Other	12.59%	6.82%	4.54%

March 31, 2017
Credit Union Investment Performance
US Credit Unions -- 1 - 5 Billion in Assets
Quartile Distribution by Investment Yield

	Top Quartile	Average	Bottom Quartile
Yield *	1.86%	1.31%	0.92%
Total Assets ($000)	2,361,943	2,253,207	2,251,743
Inv Securities ($000)	603,948	406,235	234,220
Inv in CU's and Banks	4,662	10,891	10,166
Cash Equiv	140,560	214,945	254,232
Inv & Cash Equiv/Assets %	31.72%	28.05%	22.14%
Loans/Assets %	64.67%	66.00%	74.25%
% AFS	83.96%	70.66%	52.62%
% Treasury	1.25%	2.26%	6.38%
% Agency	15.13%	22.04%	25.08%
% MBS	30.59%	19.38%	7.22%
% CMO	22.41%	13.61%	4.10%
% Inv in CU's and Banks	0.63%	1.75%	2.08%
% Cash Equivalents	18.88%	34.60%	52.05%
% Other	11.11%	6.35%	3.09%

Seminar Attendees: Excess Liquidity Portfolio Performance

Top Half by Bond Portfolio Performance

Total Assets	Securities (incl CD's)	Cash Equiv	ROA	ROE	Yield	UnReal G/L %	Real G/L	Cash	TSY	CDs	AGY	MUNI	MBS	CMO	OTH
467,963	204,356	20,010	0.42	4.47	2.85	(1.1)	70	8.9	-	-	-	9.0	(0.5)	37.2	45.3
221,927	30,506	18,959	0.83	11.43	2.16	(1.0)	-	38.3	-	10.0	-	-	26.3	1.6	23.7
1,340,724	222,733	67,960	1.22	13.04	1.73	(1.0)	-	23.4	-	1.5	4.3	14.5	23.7	24.4	8.2
785,741	74,274	65,102	0.28	3.07	1.54	(2.3)	35	46.7	-	0.2	13.4	-	26.4	11.7	1.6
1,224,494	272,136	90,467	0.41	3.55	1.47	(0.3)	8	24.9	-	0.1	8.5	-	43.9	17.4	5.1
1,087,993	176,222	109,864	0.92	8.76	1.44	1.2	-	38.4	-	-	20.1	11.4	18.5	11.2	0.4
2,565,181	154,131	152,272	0.76	7.23	1.27	(1.0)	405	49.7	-	0.1	12.7	-	25.9	4.5	7.2
2,644,901	255,366	243,200	0.52	4.95	1.27	(0.4)	-	48.8	-	-	4.6	9.0	22.5	3.8	11.4
1,371,299	47,031	193,433	0.59	5.59	1.23	0.1	-	80.4	4.7	0.7	0.7	1.8	9.2	1.1	1.3
839,327	39,966	44,892	0.37	4.14	1.22	(1.0)	3	52.9	-	-	7.1	-	9.5	12.4	18.0
270,903	28,680	16,704	0.89	9.64	1.19	(0.1)	-	36.8	4.8	30.4	7.7	-	14.5	-	5.8
1,165,496	**136,855**	**92,988**	**0.66**	**6.90**	**1.58**	**-0.6**	**47**	**40.8**	**0.9**	**3.9**	**7.2**	**4.2**	**20.0**	**11.4**	**11.6**

Bottom Half by Bond Portfolio Performance

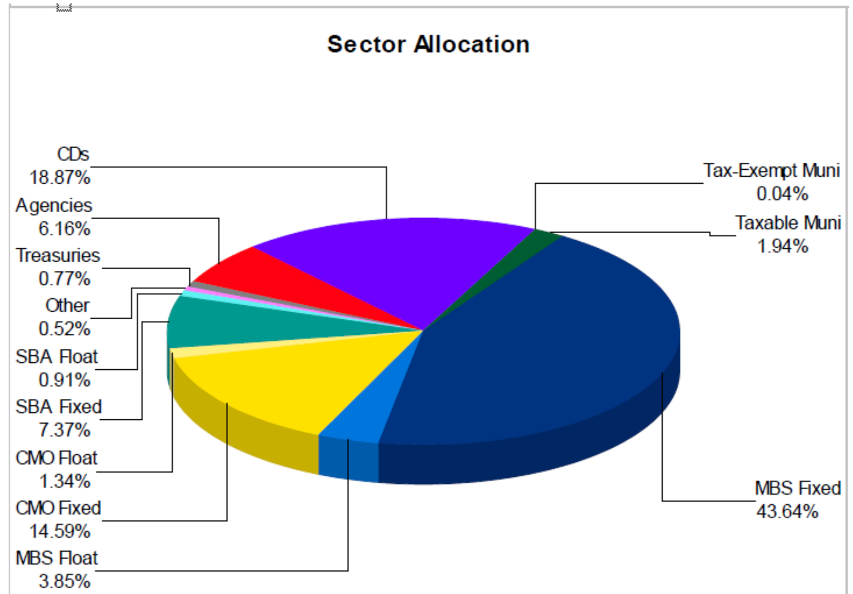
Total Assets	Securities (incl CD's)	Cash Equiv	ROA	ROE	Yield	UnReal G/L %	Real G/L	Cash	TSY	CDs	AGY	MUNI	MBS	CMO	OTH
206,871	62,939	64,461	0.37	3.27	1.17	(1.0)	-	50.6	-	-	14.4	-	9.4	12.5	13.1
1,007,933	203,846	153,153	0.69	6.96	1.14	-	-	42.9	-	21.0	21.5	-	0.5	3.5	10.6
174,994	46,055	23,919	1.24	15.22	1.13	-	-	34.2	22.1	24.1	5.7	-	13.6	-	0.3
74,268	15,361	13,150	0.97	8.89	1.13	-	-	46.1	-	53.4	-	-	-	-	0.5
103,851	11,627	11,100	0.40	4.42	1.11	0.5	-	48.8	-	14.9	2.2	-	4.3	-	29.7
4,776,895	917,734	729,699	1.14	10.87	1.10	(0.7)	2	44.3	16.2	-	13.0	2.4	9.7	13.4	1.0
955,398	92,498	144,928	1.36	15.75	1.08	0.7	48	61.0	6.4	-	23.8	-	6.7	0.8	1.3
1,131,009	27,594	57,312	0.62	6.86	1.02	0.5	-	67.5	-	21.9	1.0	-	7.3	0.5	1.8
1,485,596	123,983	133,711	0.83	7.83	1.02	(0.6)	52	51.9	0.4	-	17.7	-	12.6	8.9	8.5
169,010	21,122	29,638	(0.44)	(4.77)	1.00	(0.2)	-	58.4	-	34.5	-	-	6.5	-	0.6
1,423,741	162,878	138,448	1.25	8.14	0.97	1.0	-	45.9	-	49.5	-	-	-	-	4.5
1,652,097	8,591	273,555	0.40	5.05	0.93	0.9	-	97.0	-	-	0.2	-	1.8	-	1.1
1,096,805	**141,186**	**147,756**	**0.74**	**7.37**	**1.07**	**0.2**	**9**	**54.1**	**3.8**	**18.3**	**8.3**	**0.2**	**6.0**	**3.3**	**6.1**

1,007,933	**74,274**	**67,960**	**0.69**	**6.96**	**1.17**	**-0.2**	**0**	***47.7***	***2.4***	***11.4***	***7.8***	***2.1***	***12.7***	***7.2***	***8.7***

May 2017 Portfolio Summary

All Credit Union Portfolios Portfolios on Baker Bond Accounting (BBA)

- Avg. Book Yield = 2.8%
- Avg. Life = 3.4 years
- +300bps Avg. Life = 3.9 years
- +300bps Price Risk = 8.92%



Sector Name	Inst. % of Total	Gn / (Ls) %	Yield			Avg life			Eff	Eff	% Px Change	
			Acct	Proj	Mrkt	Proj	-300	+300	Dur	Cnvx	-300	+300
Treasuries	0.8	0.28%	1.38	1.38	1.27	1.78	1.78	1.78	1.76	0.03	2.55	(5.04)
Agencies	6.2	(0.34)%	1.95	2.02	2.04	4.34	1.01	5.02	3.32	(1.14)	2.96	(12.53)
CDs	18.9	(0.01)%	1.44	1.44	1.43	1.41	1.37	1.44	1.37	0.00	2.26	(4.02)
Tax-Exempt Muni	0.0	0.61%	1.76	1.76	1.57	6.44	6.44	6.51	2.25	(0.18)	3.78	(7.07)
Taxable Muni	1.9	0.19%	2.35	2.36	2.17	3.84	3.82	4.03	3.58	0.07	8.64	(10.08)
MBS Fixed	43.6	(0.71)%	1.89	1.99	2.15	3.95	2.82	4.60	2.96	(0.43)	4.44	(10.54)
MBS Float	3.8	(1.59)%	1.10	1.59	1.95	4.57	3.34	5.41	0.88	(0.17)	2.04	(4.66)
CMO Fixed	14.6	(0.73)%	1.96	1.97	2.19	3.51	2.34	4.63	2.95	(0.43)	4.32	(11.00)
CMO Float	1.3	(2.73)%	2.18	2.13	2.89	3.85	3.30	4.47	1.72	0.15	4.63	(4.45)
SBA Fixed	7.4	(1.47)%	1.91	1.92	2.35	3.45	2.53	3.92	2.71	0.01	4.30	(8.77)
SBA Float	0.9	(0.51)%	1.88	1.84	1.91	5.13	5.66	3.51	1.49	(0.29)	(1.37)	(3.72)
Other	0.5	(0.41)%	1.62	1.63	1.91	2.08	2.07	2.25	2.06	0.01	4.19	(6.09)
APM Totals	**100%**	**(0.65)**	$\boxed{\textbf{1.80}}$	$\boxed{\textbf{1.86}}$	**2.02**	$\boxed{\textbf{3.40}}$	**2.40**	**3.95**	**2.55**	**(0.32)**	**3.83**	$\boxed{\textbf{(8.92)}}$

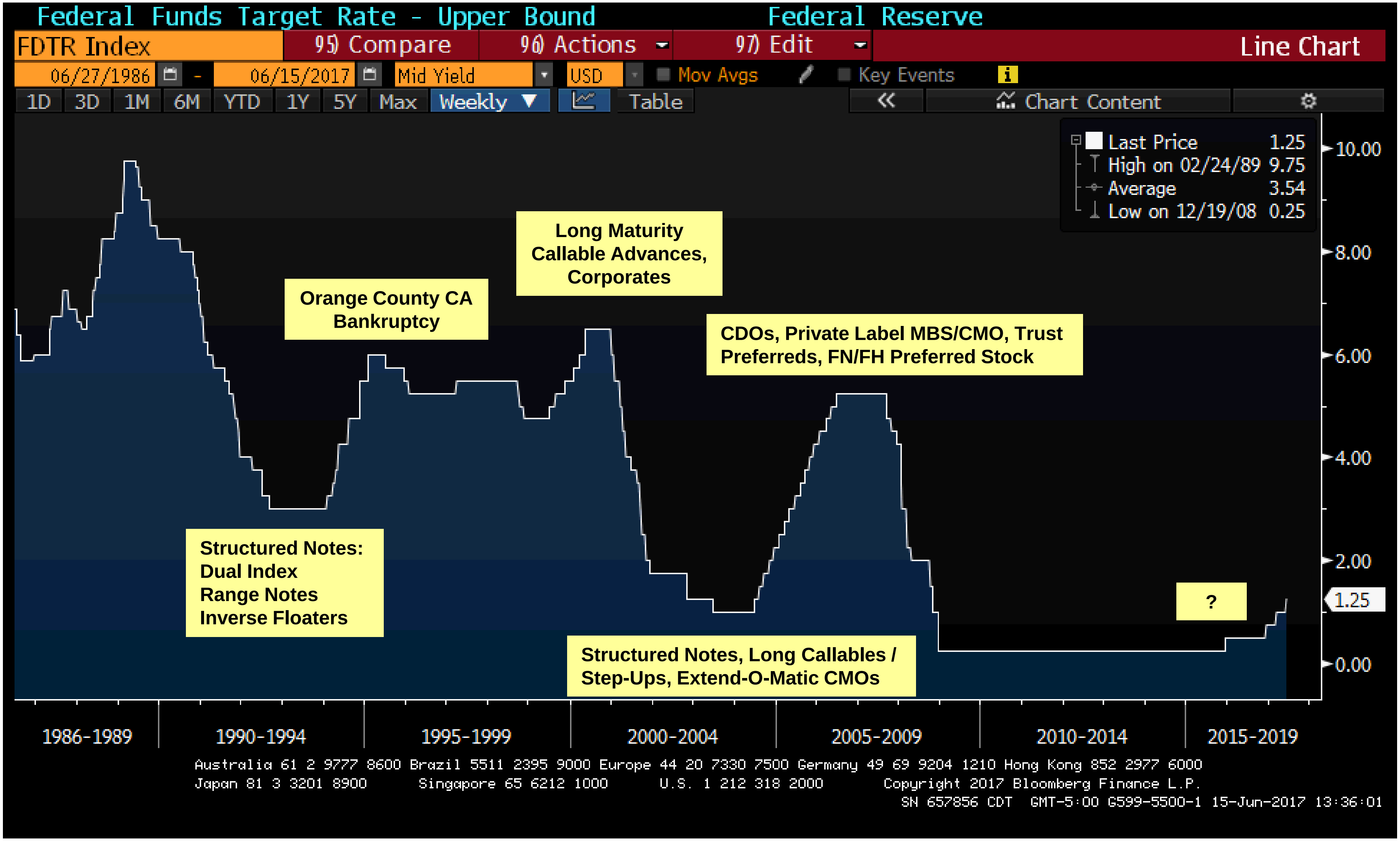
Credit Union Investment Portfolio Management:

Characteristics of High Performance

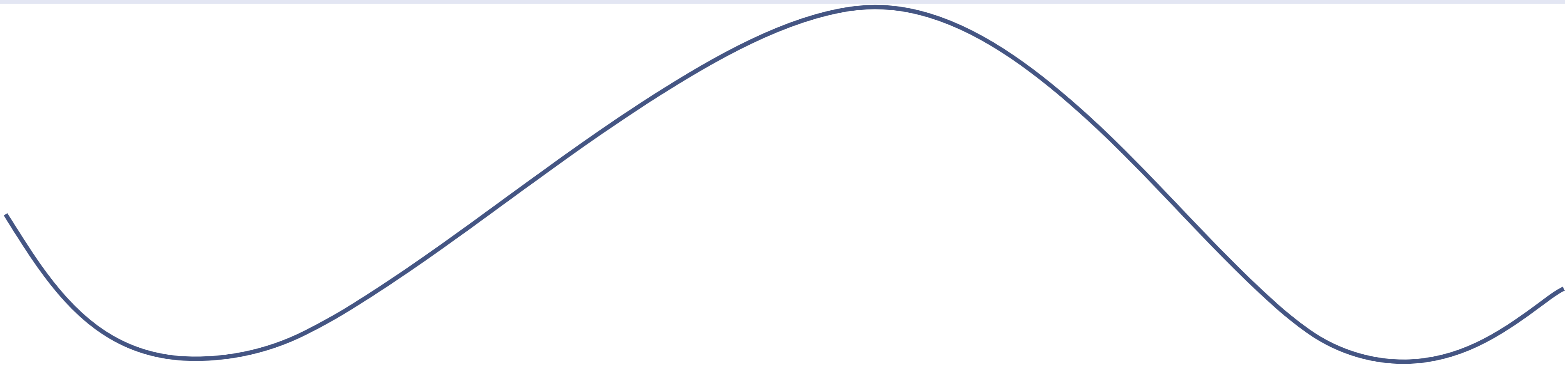
- Use The Investment Portfolio To Fight Margin Erosion
  - The bond portfolio is the only place we can increase margin without hurting the membership
- Define, Measure & Manage
  - Define your portfolio objectives & risk tolerance
  - Measure your risk exposure – quality analytics and easy to understand 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

Fed Funds Target Rate

June 1986 - Today



The Interest Rate Cycle and Asset Strategies



Trough	Rising	Peak	Falling
Reduce duration	Transition duration to neutral	Extend duration	Transition duration to neutral
Premiums and/or higher coupons	Transition from higher to lower coupons	Discounts and/or lower coupons	Transition from higher to lower coupons
Roll up in coupon		Roll down in coupon	
Buy negative convexity		Reduce negative convexity	
High cashflow bonds		Lockouts	
Buy ARMs & floaters	Buy ARMs & floaters	Sell ARMs & floaters	Sell ARMs & floaters
Current pay CMBS	Current pay CMBS	Lockout CMBS	Lockout CMBS
Prepay protection important	Prepay protection less important	Prepay protection more important	Prepay protection critical
1X Callable Agencies	Continuous calls outperform	Bullet agencies or callables with call protection	Bullet agencies or callables with call protection
Cushion callables		Discount callables	

Possible Liquidity Risks from Rising Interest Rates

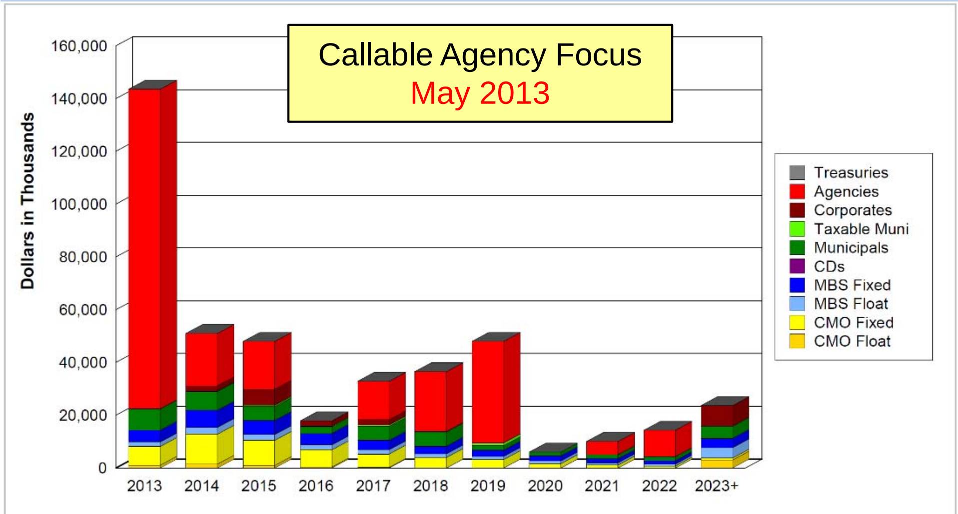
Reduced Mortgage/Loan Payments	• Refinance incentive goes away
Reduced Deposit Levels	• Migration / Disintermediation
Increased Loan Demand	• Local economic activity improves
Options Risk (Callable Bonds and MBS/CMOs)	• Call Options no longer “in-the-money”
Reduced Asset Valuations	• Can no longer painlessly liquidate securities / monetize loans
Reduced Borrowing Capacity (Can be related to #5)	• Increased haircuts / requirements for REPO lines, etc.

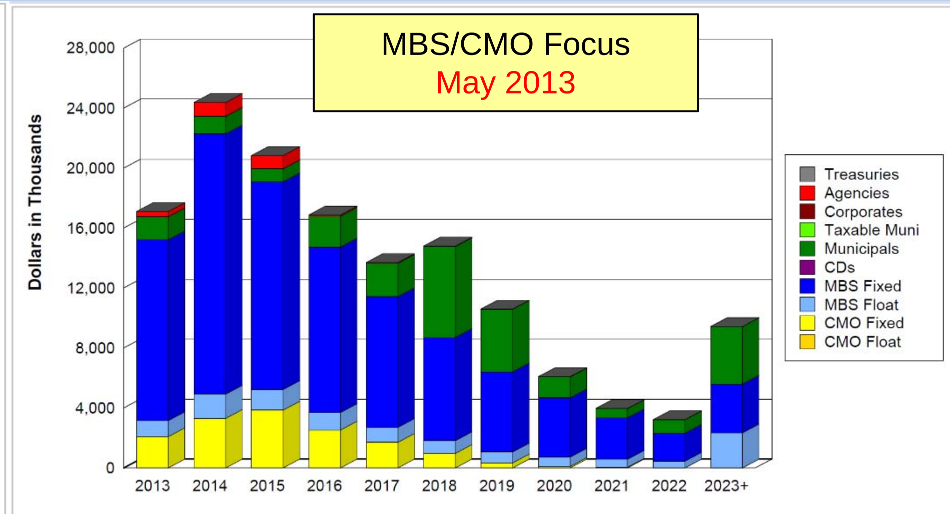
10-Year Treasury Yield

Jan 2011 - Today

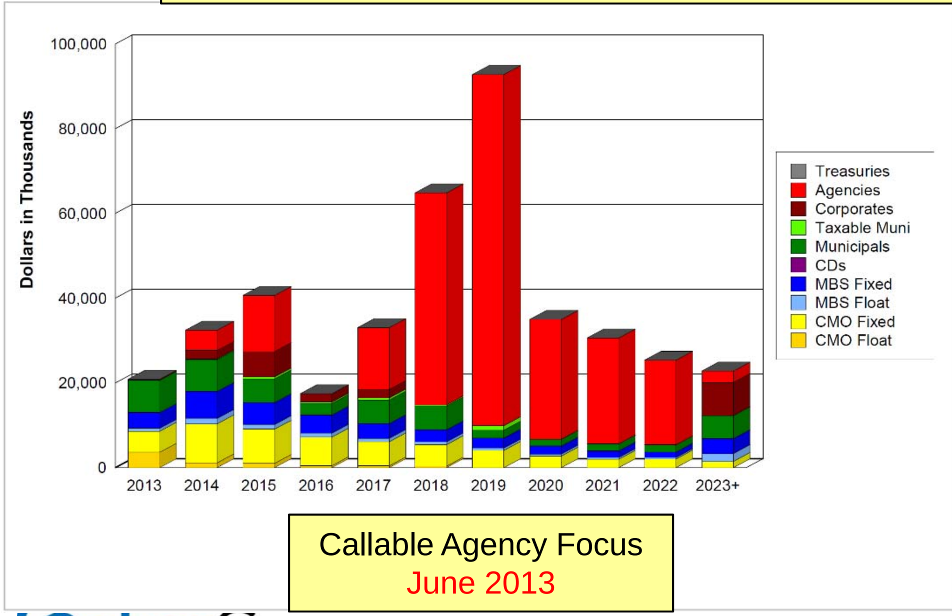
Projected Cash Flow Volatility During 2013 “Taper Tantrum”

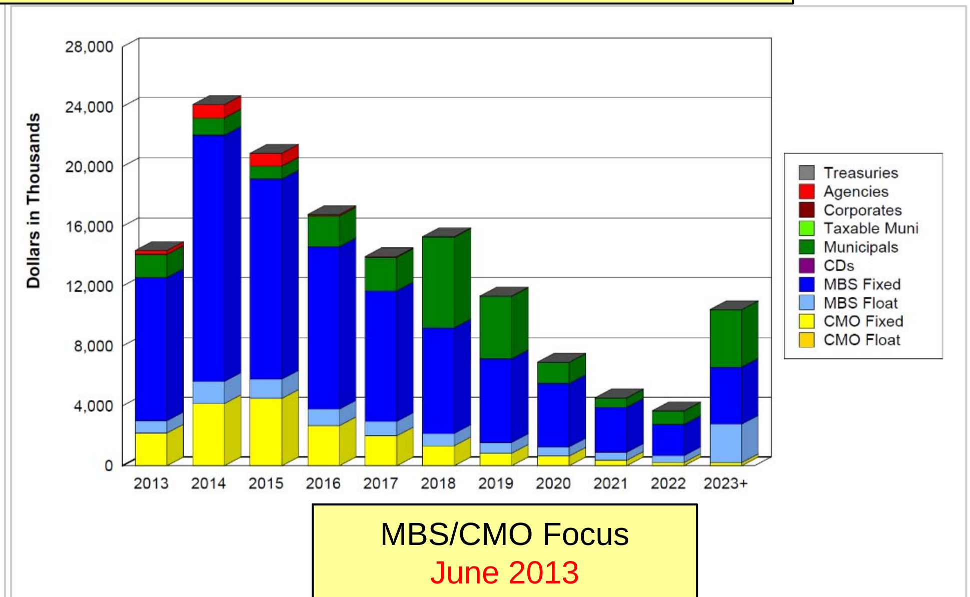
Callable Agencies vs MBS/CMO





Investment portfolio cashflow is one of the most important sources of liquidity that can also provide the necessary earnings to increase net worth. But we must ensure that our cashflow is stable and predictable as rates rise.





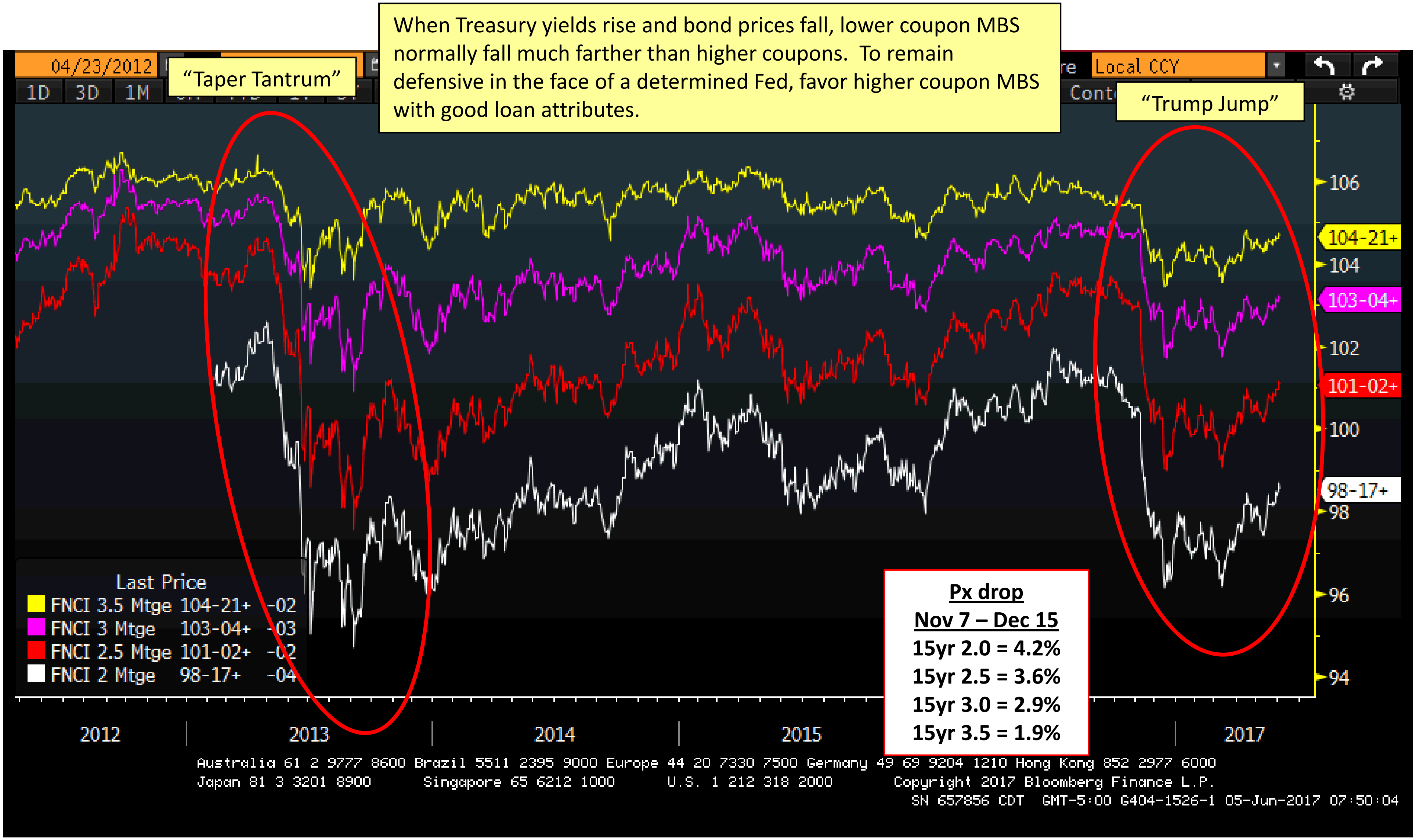
OakerGroup

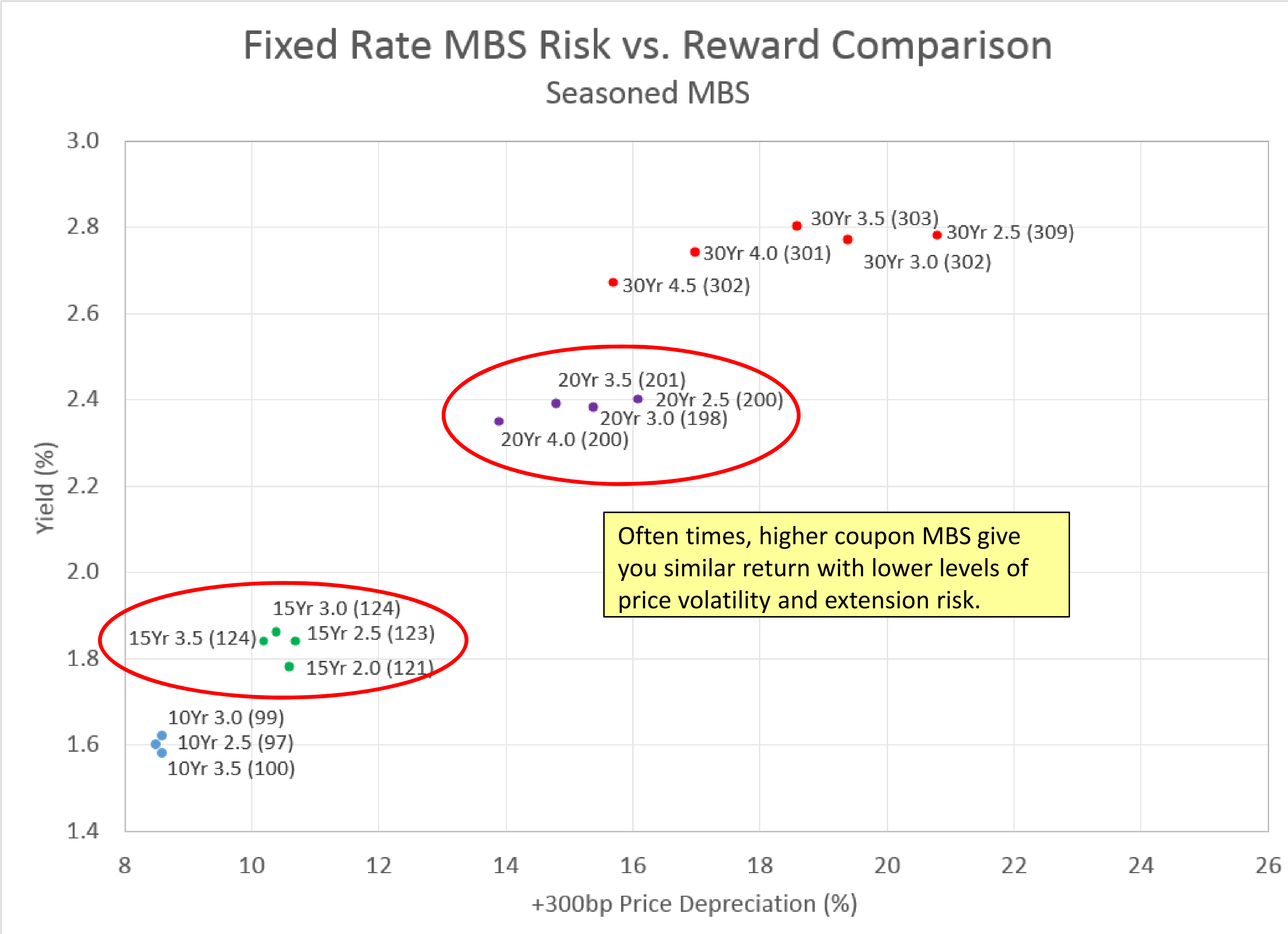
Extension Protection Menu: MBS/CMO

- Low Loan Balance Collateral
  - LLB pools have slowed the LEAST over the last 6mos of falling prepayments.
- Relocation Pools
  - Relos tend to be less rate sensitive and often prepay faster than their cohort when “out of the money” as the homeowners are relocated by their employees.
- Roll Down in MBS Terms and Up in Coupon
  - Aggregate 10yr terms are now paying faster than 15yrs, 20yrs, and 30yrs!
  - The lowest coupons in the stack are showing significant extension risks at current prepay speeds
- Agency CMBS: K-Fred Lockout (A2) and/or FNMA DUS
  - Steady Predictable Cash Flows are crucial in a rising rate environment.
- PAC/VADM CMOs
  - Planned Amortization Class CMOs are often structured to limit extension risk by creating support tranches that “give-up” their principal when prepays slow
  - “Very Accurately Defined Maturity” CMOs can be structured to have virtually no change in cash flows across a range of prepay speeds
  - Short stated final CMOs or those with short pay windows “roll down the curve” better than longer WAM MBS

Focus on Higher Coupon MBS To Limit Price Depreciation

15yr MBS Price Volatility By Coupon




Fixed Rate MBS Risk vs. Reward Comparison
Seasoned MBS
Yield (%)
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
8
10
12
14
16
18
20
22
24
26
+300bp Price Depreciation (%)
30Yr 3.5 (303)
30Yr 2.5 (309)
30Yr 4.0 (301)
30Yr 3.0 (302)
30Yr 4.5 (302)
20Yr 3.5 (201)
20Yr 2.5 (200)
20Yr 3.0 (198)
20Yr 4.0 (200)
15Yr 3.0 (124)
15Yr 3.5 (124)
15Yr 2.5 (123)
15Yr 2.0 (121)
10Yr 3.0 (99)
10Yr 2.5 (97)
10Yr 3.5 (100)
Often times, higher coupon MBS give you similar return with lower levels of price volatility and extension risk.

MBS Holdings Comparison: Federal Reserve vs. Baker BBA

Federal Reserve

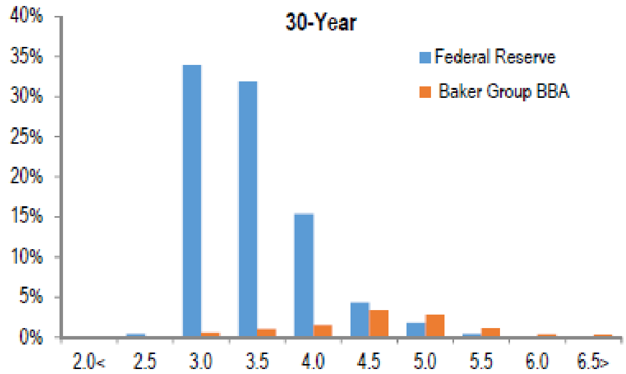
Percentage of Total Holdings (5-17-17)

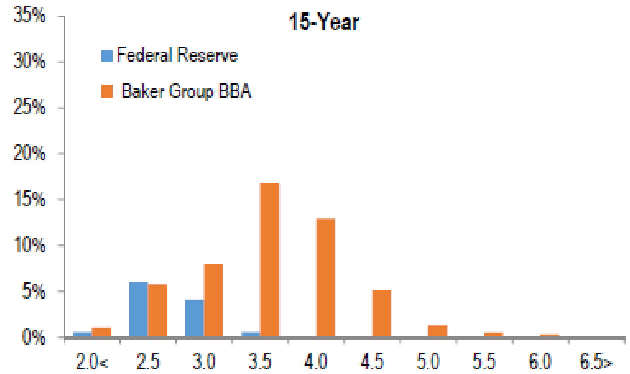
	30-Year	15-Year	Other
2.0<	0.0%	0.6%	0.0%
2.5	0.4%	6.0%	0.1%
3.0	33.9%	4.1%	0.2%
3.5	31.9%	0.6%	0.2%
4.0	15.4%	0.1%	0.0%
4.5	4.3%	0.1%	0.0%
5.0	1.8%	0.0%	0.0%
5.5	0.4%	0.0%	0.0%
6.0	0.1%	0.0%	0.0%
6.5>	0.0%	0.0%	0.0%
	88.1%	**11.4%**	**0.5%**

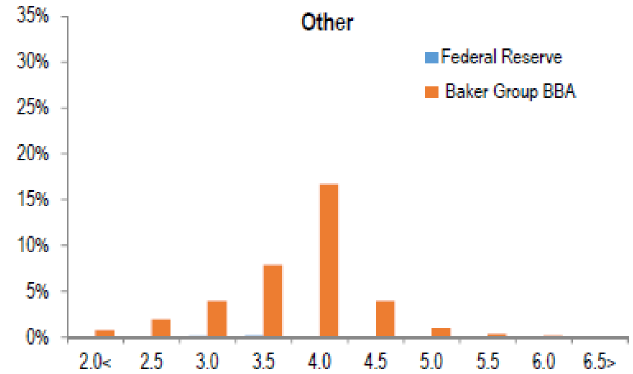
Baker Group BBA

Percentage of Total Holdings (Apr 2017)

	30-Year	15-Year	Other
2.0<	0.0%	1.0%	0.8%
2.5	0.1%	5.8%	2.0%
3.0	0.6%	8.0%	4.0%
3.5	1.1%	16.8%	7.9%
4.0	1.5%	12.9%	16.7%
4.5	3.4%	5.2%	4.0%
5.0	2.8%	1.3%	1.0%
5.5	1.1%	0.5%	0.4%
6.0	0.3%	0.3%	0.2%
6.5>	0.3%	0.1%	0.1%
	11.2%	**51.9%**	**36.9%**







Dynamic Liquidity Monitor Case Study – Base Case

SHOCK: 0| 0 (12 Mo.)

Dynamic Liquidity Monitor (DLM)

		Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	12Mo Totals
	Starting Cash Balances (Cash & Due & FFS)	7,895	6,779	6,739	6,679	6,712	6,681	6,679	6,654	6,599	6,545	6,499	6,443	
% Adj	**SOURCES**													
	Loan Maturities	597	891	2,182	4,734	930	2,169	1,158	29	939	260	106	610	14,605
	Loan Paydowns	743	681	718	672	666	629	629	618	591	597	571	579	7,694
	Investment Maturities & Prepayments	640	2,383	1,877	621	365	1,859	854	847	590	2,585	846	2,757	16,224
2%	New Deposits @ 2.00% Ann. Rate	176	176	176	176	176	176	176	176	176	176	176	176	2,114
98%	Time Deposit Renewals (98.00%)	5,175	1,709	3,968	1,861	1,272	998	1,154	1,530	2,325	1,285	1,579	1,462	24,318
0%	Migration from Time Deposits to NMD (0.00%)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Plug for Large Deposit Inflows or Other Large Inflows													-
	Total Projected Sources of Funds	**7,332**	**5,840**	**8,921**	**8,064**	**3,409**	**5,831**	**3,972**	**3,200**	**4,621**	**4,903**	**3,278**	**5,584**	**64,954**
% Adj	**USES**													
98%	Loan Renewals (98.00%)	1,313	1,541	2,842	5,298	1,564	2,742	1,751	634	1,499	840	663	1,165	21,853
4%	New Loans @ 4.00% Ann. Growth	213	213	213	213	213	213	213	213	213	213	213	213	2,558
	Net Change in Loans	186	182	155	105	181	157	177	200	183	196	200	189	2,112
100%	Investment Purchases (100.00%)	640	2,383	1,877	621	365	1,859	854	847	590	2,585	846	2,757	16,224
0%	New Securities @ 0.00% Ann. Growth	-	-	-	-	-	-	-	-	-	-	-	-	-
0%	NMD Runoff @ 0.00% Ann. Rate	-	-	-	-	-	-	-	-	-	-	-	-	-
	Time Deposit Maturities	5,281	1,744	4,049	1,899	1,298	1,018	1,178	1,561	2,372	1,311	1,611	1,492	24,814
	Borrowing Maturities	-	-	-	-	-	-	-	-	-	-	-	-	-
	Unfunded Commitments Funding	1,000												1,000
	Total Projected Uses of Funds	**8,447**	**5,881**	**8,981**	**8,031**	**3,440**	**5,832**	**3,996**	**3,255**	**4,675**	**4,949**	**3,334**	**5,627**	**66,449**
	Projected Net Monthly Cash Flow	**(1,116)**	**(40)**	**(60)**	**33**	**(31)**	**(1)**	**(25)**	**(55)**	**(54)**	**(46)**	**(56)**	**(43)**	
	Ending Cash Balance	**6,779**	**6,739**	**6,679**	**6,712**	**6,681**	**6,679**	**6,654**	**6,599**	**6,545**	**6,499**	**6,443**	**6,400**	
	Ending Cash Balance / Total Assets	**5.3%**	**5.3%**	**5.2%**	**5.3%**	**5.2%**	**5.2%**	**5.2%**	**5.2%**	**5.1%**	**5.1%**	**5.1%**	**5.0%**	
	Policy Guideline	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	
	Within Policy Guideline	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	
	Available Line of Credit	**19,210**												

Stress Testing Your Liquidity Risk Management Program

Liquidity Stress Scenario # 1 – Economic Recovery Scenario

Stress Events

- Market Interest Rates Increase 100bps
- Increased Loan Demand – 20% Annualized Loan Growth
- Unfunded Commitments Fund at High Percentage – 50% Draw Within 120 Days

Strategic Questions to Ask

- Do we have enough on-balance sheet liquidity to fund these events?
- Do we have adequate contingent sources of liquidity?
- How does our cash flow change with an increase in market rates?
- What are the roles and responsibilities of senior management?

Stress Test #1 – Economic Recovery Scenario

SHOCK: +100|+100 (12 Mo.)

Dynamic Liquidity Monitor (DLM)

% Adj		Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	12Mo Totals
	Starting Cash Balances (Cash & Due & FFS)	7,895	4,900	1,975	(996)	(3,924)	(4,839)	(5,749)	(6,663)	(7,584)	(8,521)	(9,437)	(10,359)	
% Adj	**SOURCES**													
	Loan Maturities	597	891	2,182	4,734	942	2,169	1,159	29	941	260	108	611	14,623
	Loan Paydowns	531	490	513	484	476	447	451	440	422	427	408	419	5,508
	Investment Maturities & Prepayments	588	534	329	575	321	317	312	308	552	2,546	309	2,222	8,913
2%	New Deposits @ 2.00% Ann. Rate	176	176	176	176	176	176	176	176	176	176	176	176	2,114
98%	Time Deposit Renewals (98.00%)	5,175	1,709	3,968	1,861	1,272	998	1,154	1,530	2,325	1,285	1,579	1,462	24,318
0%	Migration from Time Deposits to NMD (0.00%)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Plug for Large Deposit Inflows or Other Large Inflows													-
	Total Projected Sources of Funds	**7,068**	**3,800**	**7,168**	**7,830**	**3,187**	**4,107**	**3,253**	**2,483**	**4,416**	**4,694**	**2,580**	**4,890**	**55,475**
% Adj	**USES**													
100%	Loan Renewals (100.00%)	1,128	1,381	2,695	5,218	1,418	2,616	1,610	469	1,363	687	516	1,030	20,131
20%	New Loans @ 20.00% Ann. Growth	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	12,791
	Net Change in Loans	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	12,791
100%	Investment Purchases (100.00%)	588	534	329	575	321	317	312	308	552	2,546	309	2,222	8,913
0%	New Securities @ 0.00% Ann. Growth	-	-	-	-	-	-	-	-	-	-	-	-	-
0%	NMD Runoff @ 0.00% Ann. Rate	-	-	-	-	-	-	-	-	-	-	-	-	-
	Time Deposit Maturities	5,281	1,744	4,049	1,899	1,298	1,018	1,178	1,561	2,372	1,311	1,611	1,492	24,814
	Borrowing Maturities	-	-	-	-	-	-	-	-	-	-	-	-	-
	Unfunded Commitments Funding	2,000	2,000	2,000	2,000									8,000
	Total Projected Uses of Funds	**10,063**	**6,725**	**10,139**	**10,758**	**4,103**	**5,017**	**4,166**	**3,404**	**5,353**	**5,610**	**3,502**	**5,810**	**74,649**
	Projected Net Monthly Cash Flow	**(2,995)**	**(2,925)**	**(2,971)**	**(2,928)**	**(916)**	**(910)**	**(913)**	**(921)**	**(937)**	**(916)**	**(922)**	**(920)**	
	Ending Cash Balance	**4,900**	**1,975**	**(996)**	**(3,924)**	**(4,839)**	**(5,749)**	**(6,663)**	**(7,584)**	**(8,521)**	**(9,437)**	**(10,359)**	**(11,278)**	
	Ending Cash Balance / Total Assets	**3.8%**	**1.6%**	**-0.8%**	**-3.1%**	**-3.8%**	**-4.5%**	**-5.2%**	**-6.0%**	**-6.7%**	**-7.4%**	**-8.1%**	**-8.9%**	
	Policy Guideline	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	
	Within Policy Guideline	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	
	Available Line of Credit	**19,210**												

Stress Testing Your Liquidity Risk Management Program

Liquidity Stress Scenario # 2 – Negative Publicity Scenario

Stress Events

- Non-Maturity Depositor Runoff – 10% Annualized Rate
- Time Deposits Renewal Rate Decreases – 80% Renewal Rate
- Loss of Large Depositor - $1 Million Depositor Leaves
- Inability to Attract New Deposits – 0% New Deposit Money

Strategic Questions to Ask

- Do we have enough on-balance sheet liquidity to fund these events?
- Do we have adequate contingent sources of liquidity?
- What are the roles and responsibilities of senior management?

Stress Test #2 – Negative Publicity Scenario

SHOCK: 0| 0 (12 Mo.)

Dynamic Liquidity Monitor (DLM)

		Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	12Mo Totals
	Starting Cash Balances (Cash & Due & FFS)	7,895	5,077	3,971	2,431	1,371	355	(582)	(1,570)	(2,658)	(3,890)	(4,924)	(6,021)	
% Adj	**SOURCES**													
	Loan Maturities	597	891	2,182	4,734	930	2,169	1,158	29	939	260	106	610	14,605
	Loan Paydowns	743	681	718	672	666	629	629	618	591	597	571	579	7,694
	Investment Maturities & Prepayments	640	2,383	1,877	621	365	1,859	854	847	590	2,585	846	2,757	16,224
0%	New Deposits @ 0.00% Ann. Rate	-	-	-	-	-	-	-	-	-	-	-	-	-
80%	Time Deposit Renewals (80.00%)	4,225	1,395	3,239	1,519	1,038	814	942	1,249	1,898	1,049	1,289	1,194	19,851
0%	Migration from Time Deposits to NMD (0.00%)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Plug for Large Deposit Inflows or Other Large Inflows													-
	Total Projected Sources of Funds	**6,205**	**5,350**	**8,016**	**7,546**	**2,999**	**5,471**	**3,583**	**2,743**	**4,018**	**4,491**	**2,812**	**5,140**	**58,374**
% Adj	**USES**													
98%	Loan Renewals (98.00%)	1,313	1,541	2,842	5,298	1,564	2,742	1,751	634	1,499	840	663	1,165	21,853
4%	New Loans @ 4.00% Ann. Growth	213	213	213	213	213	213	213	213	213	213	213	213	2,558
	Net Change in Loans	186	182	155	105	181	157	177	200	183	196	200	189	2,112
100%	Investment Purchases (100.00%)	640	2,383	1,877	621	365	1,859	854	847	590	2,585	846	2,757	16,224
0%	New Securities @ 0.00% Ann. Growth	-	-	-	-	-	-	-	-	-	-	-	-	-
10%	NMD Runoff @ 10.00% Ann. Rate	575	575	575	575	575	575	575	575	575	575	575	575	6,904
	Time Deposit Maturities	5,281	1,744	4,049	1,899	1,298	1,018	1,178	1,561	2,372	1,311	1,611	1,492	24,814
	Borrowing Maturities	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of Large Depositor	1,000												1,000
	Total Projected Uses of Funds	**9,023**	**6,456**	**9,557**	**8,606**	**4,016**	**6,408**	**4,572**	**3,831**	**5,250**	**5,524**	**3,909**	**6,203**	**73,353**
	Projected Net Monthly Cash Flow	**(2,818)**	**(1,106)**	**(1,540)**	**(1,060)**	**(1,016)**	**(936)**	**(988)**	**(1,088)**	**(1,232)**	**(1,034)**	**(1,097)**	**(1,063)**	
	Ending Cash Balance	**5,077**	**3,971**	**2,431**	**1,371**	**355**	**(582)**	**(1,570)**	**(2,658)**	**(3,890)**	**(4,924)**	**(6,021)**	**(7,084)**	
	Ending Cash Balance / Total Assets	**4.0%**	**3.1%**	**1.9%**	**1.1%**	**0.3%**	**-0.5%**	**-1.2%**	**-2.1%**	**-3.1%**	**-3.9%**	**-4.7%**	**-5.6%**	
	Policy Guideline	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	
	Within Policy Guideline	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	
	Available Line of Credit	**19,210**												

Stress Testing Your Liquidity Risk Management Program

Liquidity Stress Scenario # 3 – Apocalyptic Scenario

Stress Events

- Market Interest Rates Increase 400bps
- Increased Loan Demand – 20% Annualized Loan Growth
- Non-Maturity Depositor Runoff – 20% Annualized Rate
- Time Deposits Renewal Rate Decreases – 50% Renewal Rate
- Inability to Attract New Deposits – 0% New Deposit Money
- Loss of Large Depositor - $1 Million Depositors Leaves

Strategic Questions to Ask

- Do we have enough on-balance sheet liquidity to fund these events?
    - Do we need to sell assets?
- Do we have adequate contingent sources of liquidity?
- How does our cash flow change with an increase in market rates?
- What are the roles and responsibilities of senior management?

Stress Test #3 – Apocalyptic Scenario

SHOCK: +400|+400 (0 Mo.)

Dynamic Liquidity Monitor (DLM)

% Adj		Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	12Mo Totals
	Starting Cash Balances (Cash & Due & FFS)	7,895	2,057	(1,007)	(5,198)	(8,263)	(11,103)	(13,779)	(16,556)	(19,547)	(22,925)	(25,786)	(28,801)	
% Adj	**SOURCES**													
	Loan Maturities	598	894	2,184	4,735	953	2,172	1,161	29	945	260	112	615	14,658
	Loan Paydowns	351	323	341	319	308	291	291	285	270	274	265	271	3,589
	Investment Maturities & Prepayments	552	498	293	541	287	285	281	278	522	2,519	283	1,990	8,329
0%	New Deposits @ 0.00% Ann. Rate	-	-	-	-	-	-	-	-	-	-	-	-	-
50%	Time Deposit Renewals (50.00%)	2,641	872	2,025	950	649	509	589	781	1,186	656	806	746	12,407
0%	Migration from Time Deposits to NMD (0.00%)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Plug for Large Deposit Inflows or Other Large Inflows													-
	Total Projected Sources of Funds	**4,142**	**2,587**	**4,843**	**6,545**	**2,197**	**3,257**	**2,322**	**1,373**	**2,923**	**3,709**	**1,466**	**3,622**	**38,983**
% Adj	**USES**													
98%	Loan Renewals (98.00%)	930	1,193	2,475	4,953	1,236	2,414	1,423	308	1,191	523	369	868	17,882
20%	New Loans @ 20.00% Ann. Growth	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066	12,791
	Net Change in Loans	1,047	1,042	1,015	965	1,041	1,017	1,037	1,060	1,042	1,055	1,058	1,048	12,426
100%	Investment Purchases (100.00%)	552	498	293	541	287	285	281	278	522	2,519	283	1,990	8,329
0%	New Securities @ 0.00% Ann. Growth	-	-	-	-	-	-	-	-	-	-	-	-	-
20%	NMD Runoff @ 20.00% Ann. Rate	1,151	1,151	1,151	1,151	1,151	1,151	1,151	1,151	1,151	1,151	1,151	1,151	13,808
	Time Deposit Maturities	5,281	1,744	4,049	1,899	1,298	1,018	1,178	1,561	2,372	1,311	1,611	1,492	24,814
	Borrowing Maturities	-	-	-	-	-	-	-	-	-	-	-	-	-
	Loss of Large Depositor	1,000												1,000
	Total Projected Uses of Funds	**9,980**	**5,651**	**9,033**	**9,609**	**5,037**	**5,933**	**5,099**	**4,363**	**6,301**	**6,570**	**4,480**	**6,567**	**78,624**
	Projected Net Monthly Cash Flow	**(5,838)**	**(3,064)**	**(4,191)**	**(3,065)**	**(2,840)**	**(2,676)**	**(2,777)**	**(2,991)**	**(3,378)**	**(2,861)**	**(3,015)**	**(2,945)**	
	Ending Cash Balance	**2,057**	**(1,007)**	**(5,198)**	**(8,263)**	**(11,103)**	**(13,779)**	**(16,556)**	**(19,547)**	**(22,925)**	**(25,786)**	**(28,801)**	**(31,746)**	
	Ending Cash Balance / Total Assets	**1.6%**	**-0.8%**	**-4.1%**	**-6.5%**	**-8.7%**	**-10.8%**	**-13.0%**	**-15.4%**	**-18.0%**	**-20.3%**	**-22.6%**	**-24.9%**	
	Policy Guideline	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	
	Within Policy Guideline	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	
	Available Line of Credit	**19,210**												

Credit Union	Sample Credit Union
City	Anywhere
State	USA
Total Assets	$1,104,595
Period	2017Q1
Liquid Assets / Total Assets (Base)	42.35%

Liquidity Ratios (Base)	Ratio %	Benchmarks*	Outside?
Loans to Assets	52.19%	< 80%	
Borrowings & Non-member Deposits to Total Shares and Liabilities	13.70%	< 5 %	YES
Cash + Short-Term Investments* / Assets	34.57%	> 15%	
Regular Shares & Share Drafts / Total Shares & Borrowings	31.72%	> 40 %	YES

Omit & Hide HTM Securities?	NO

Stress Test Assumptions

Runoff	Low	Moderate	High
Share Drafts	5%	10%	20%
Regular Shares	5%	10%	20%
Money Market Shares	5%	10%	20%
Share Certificates	5%	10%	20%
IRA/KEOGH Accounts	5%	10%	20%
All Other Shares	5%	10%	20%
Haircut			
Draws Against Lines of Credit < 1 Year	10%	25%	50%
Borrowing Repurchases < 1 Year	10%	25%	50%
Other Notes Payable < 1 Year	10%	25%	50%
Liquidity Ratio Assumptions			
% Decrease of Cash or Short-Term Investments	10%	25%	50%

Liquidity Stress Test Analysis

Low Stress

Liquid Assets			Total
Cash on Hand			$ 5,322
Cash on Deposit in Corporate CUs			$ 13,324
Cash on Deposit in Other Financial Institutions			$ 62,155
Deposits in Commercial Banks			$ -
AFS Securities			$ 292,818
HTM Securities			$ 94,142
Total Liquid Assets			$ 467,761
Share Stress Outflows (Runoff)	**Total**	**Runoff %**	**Total Runoff**
Share Drafts	$ 139,526	5%	$ 6,976
Regular Shares	$ 168,834	5%	$ 8,442
Money Market Shares	$ 175,936	5%	$ 8,797
Share Certificates	$ 169,834	5%	$ 8,492
IRA/KEOGH Accounts	$ 79,316	5%	$ 3,966
All Other Shares	$ 3,065	5%	$ 153
Total Share Stress Outflows			$ 36,826
Borrowing Stress Outflows (Haircut)	**Total**	**Haircut %**	**Total Runoff**
Draws Against Lines of Credit < 1 Year	$ 100,000	10%	$ 10,000
Borrowing Repurchases < 1 Year	$ -	10%	$ -
Other Notes Payable < 1 Year	$ 383	10%	$ 38
Total Borrowing Stress Outflows			$ 10,038
Total Stress Outflows			$ 46,864
Liquid Assets Before Stress			$ 467,761
Less: Stressed Outflows			($46,864)
Liquid Assets After Low Stress Test			$ 420,897
Liquid Assets / Total Assets (Post Stress)			38.10%

Moderate Stress

Liquid Assets			Total
Cash on Hand			$ 5,322
Cash on Deposit in Corporate CUs			$ 13,324
Cash on Deposit in Other Financial Institutions			$ 62,155
Deposits in Commercial Banks			$ -
AFS Securities			$ 292,818
HTM Securities			$ 94,142
Total Liquid Assets			$ 467,761
Share Stress Outflows (Runoff)	**Total**	**Runoff %**	**Total Runoff**
Share Drafts	$ 139,526	10%	$ 13,953
Regular Shares	$ 168,834	10%	$ 16,883
Money Market Shares	$ 175,936	10%	$ 17,594
Share Certificates	$ 169,834	10%	$ 16,983
IRA/KEOGH Accounts	$ 79,316	10%	$ 7,932
All Other Shares	$ 3,065	10%	$ 307
Total Share Stress Outflows			$ 73,651
Borrowing Stress Outflows (Haircut)	**Total**	**Haircut %**	**Total Runoff**
Draws Against Lines of Credit < 1 Year	$ 100,000	25%	$ 25,000
Borrowing Repurchases < 1 Year	$ -	25%	$ -
Other Notes Payable < 1 Year	$ 383	25%	$ 96
Total Borrowing Stress Outflows			$ 25,096
Total Stress Outflows			$ 98,747
Liquid Assets Before Stress			$ 467,761
Less: Stressed Outflows			($98,747)
Liquid Assets After Moderate Stress Test			$ 369,014
Liquid Assets / Total Assets (Post Stress)			33.41%

High Stress

Liquid Assets			Total
Cash on Hand			$ 5,322
Cash on Deposit in Corporate CUs			$ 13,324
Cash on Deposit in Other Financial Institutions			$ 62,155
Deposits in Commercial Banks			$ -
AFS Securities			$ 292,818
HTM Securities			$ 94,142
Total Liquid Assets			$ 467,761
Share Stress Outflows (Runoff)	**Total**	**Runoff %**	**Total Runoff**
Share Drafts	$ 139,526	20%	$ 27,905
Regular Shares	$ 168,834	20%	$ 33,767
Money Market Shares	$ 175,936	20%	$ 35,187
Share Certificates	$ 169,834	20%	$ 33,967
IRA/KEOGH Accounts	$ 79,316	20%	$ 15,863
All Other Shares	$ 3,065	20%	$ 613
Total Share Stress Outflows			$ 147,302
Borrowing Stress Outflows (Haircut)	**Total**	**Haircut %**	**Total Runoff**
Draws Against Lines of Credit < 1 Year	$ 100,000	50%	$ 50,000
Borrowing Repurchases < 1 Year	$ -	50%	$ -
Other Notes Payable < 1 Year	$ 383	50%	$ 192
Total Borrowing Stress Outflows			$ 50,192
Total Stress Outflows			$ 197,494
Liquid Assets Before Stress			$ 467,761
Less: Stressed Outflows			($197,494)
Liquid Assets After High Stress Test			$ 270,267
Liquid Assets / Total Assets (Post Stress)			24.47%

Liquidity Ratios (Low Stress)	Ratio %	Benchmarks*	Outside?
Loans to Assets	54.50%	< 80%	
Borrowings & Non-member Deposits to Total Shares and Liabilities	16.43%	< 5 %	YES
Cash + Short-Term Investments* / Assets	31.12%	> 15%	
Regular Shares & Share Drafts / Total Shares & Borrowings	30.14%	> 40 %	YES

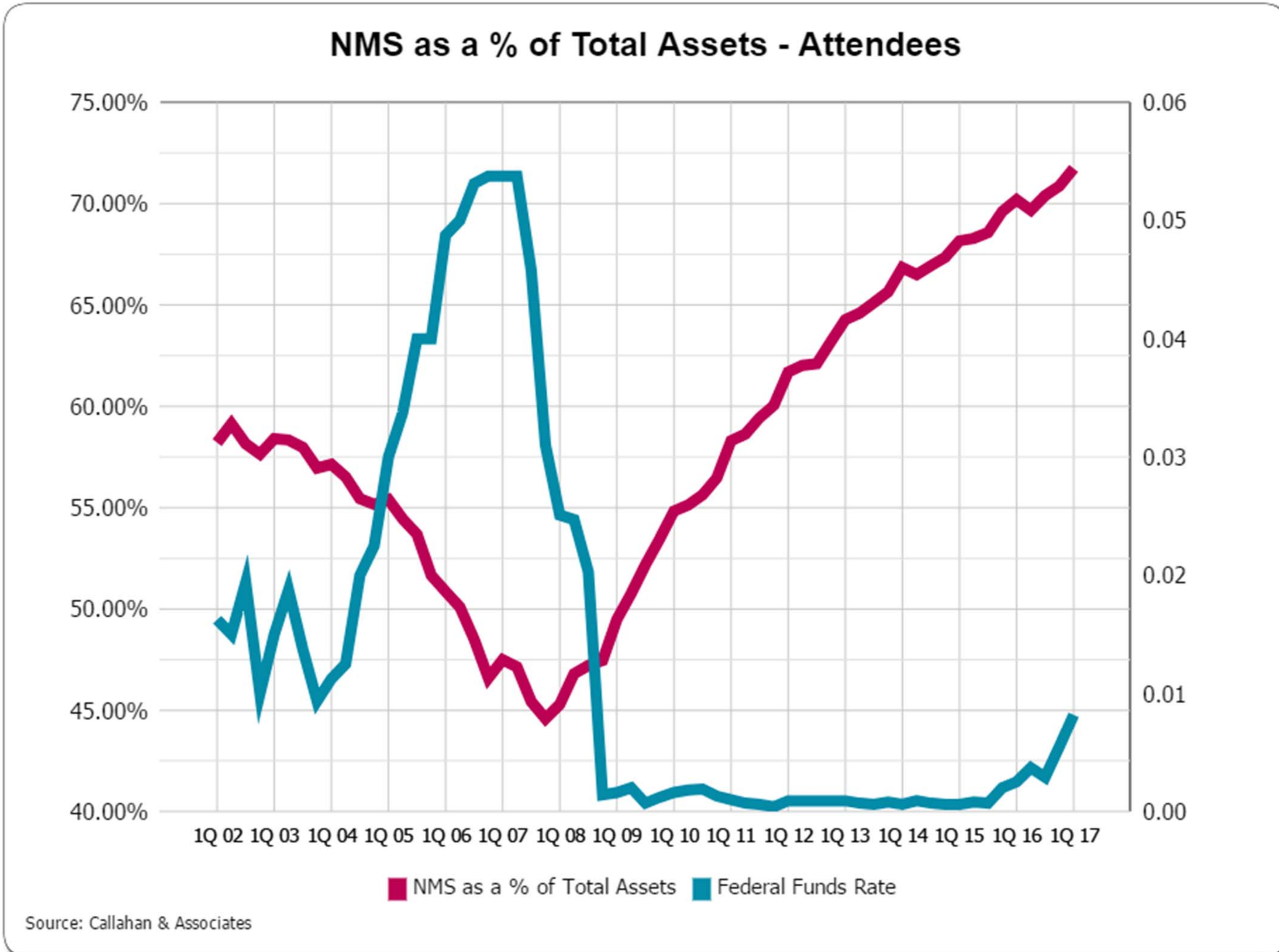
Liquidity Ratios (Moderate Stress)	Ratio %	Benchmarks*	Outside?
Loans to Assets	57.31%	< 80%	
Borrowings & Non-member Deposits to Total Shares and Liabilities	19.45%	< 5 %	YES
Cash + Short-Term Investments* / Assets	25.93%	> 15%	
Regular Shares & Share Drafts / Total Shares & Borrowings	28.55%	> 40 %	YES

Liquidity Ratios (High Stress)	Ratio %	Benchmarks*	Outside?
Loans to Assets	63.55%	< 80%	
Borrowings & Non-member Deposits to Total Shares and Liabilities	25.20%	< 5 %	YES
Cash + Short-Term Investments* / Assets	17.29%	> 15%	
Regular Shares & Share Drafts / Total Shares & Borrowings	25.38%	> 40 %	YES

Liquidity Ratio Assumptions	
Loans to Assets	Assets decrease by the total amount of stress outflows in each stress scenario.
Borrowings & Non-member Deposits to Total Shares and Liabilities	Borrowings increase by the total amount of stress outflows in each scenario.
Cash + Short-Term Investments* / Assets	Cash & Short-Term Investments decrease by the percentages listed in the stress test assumptions table under "% Decresae of Cash or Short-Term Investments."
Regular Shares & Share Drafts / Total Shares & Borrowings	Regular Shares & Share Drafts decrease by the amount of stress runoff for those share accounts.

*Short-Term Investments = Securities maturing in less than 1 Year.

*Benchmarks are guidelines based on the NCUA Automated Integrated Regulatory Examination System (AIRES) Liquidity Review Questionnaire and can be adjusted to better reflect an institution's risk appetite.


NMS as a % of Total Assets - Attendees
75.00%
70.00%
65.00%
60.00%
55.00%
50.00%
45.00%
40.00%
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1Q 02
1Q 03
1Q 04
1Q 05
1Q 06
1Q 07
1Q 08
1Q 09
1Q 10
1Q 11
1Q 12
1Q 13
1Q 14
1Q 15
1Q 16
1Q 17
NMS as a % of Total Assets
Federal Funds Rate
Source: Callahan & Associates

Sensitivity Testing: Non-Maturity Deposits

Whatever Baseline Assumptions You Use, Stress Test Them

"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 NMS. (mainly impacts earnings at risk)
2. Reduce Average Life (and Duration) assumptions in order to assess the NEV 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.

NMS Surge Balance Analysis

Can be easily generated for any credit union - call to request

Table 1: Deposit Mix Statistics (% of Total Assets)

NMD %	2002-2004	2005-2007	'90 - Now
Maximum	56%	58%	68%
Average	52%	55%	54%
Minimum	48%	52%	44%
Time %			
Average	31%	29%	19%

This institution got 68% of total funding from NMD in 4Q2014 vs. a 25yr average of just 53%. If rates rise and NMD funding reverts to the long-term average, this institution will have to replace funding for 15% of assets from CDs, Fed Funds or Borrowings. Simulating the impact of this deposit migration is critical to managing IRR in the next rate cycle.

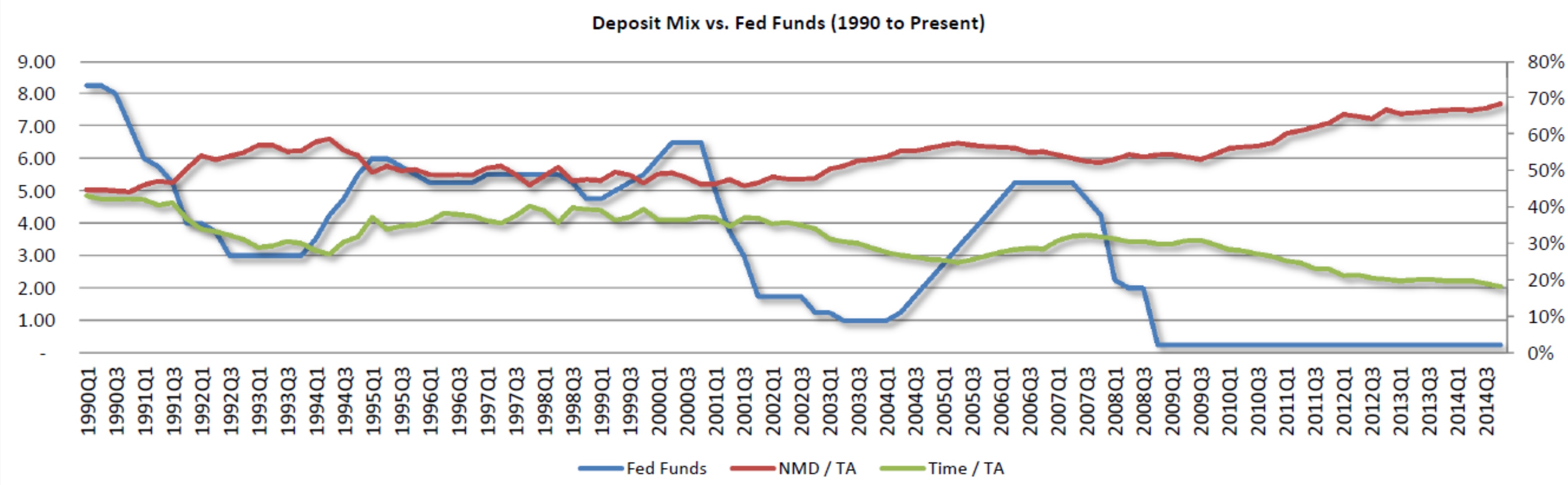
Table 2: Stress Scenarios (% of Total Assets)

Scenarios	NMD %	% Diff vs Current	Potential $ Flow
'05-'07 Min	52%	-16%	(78,240)
'90-'14 Min	44%	-24%	(117,873)
'90-'14 Avg	53%	-15%	(74,640)

*NMD: $333,019; 68% of Total Assets — Data as of 2014Q4

Table 3: Balance Data (2003 - 2014)

Averages (Yearly)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
NMD	117,902	128,648	143,814	147,994	162,738	176,610	189,207	205,588	238,457	266,432	284,610	317,408
Time	68,496	62,030	64,740	75,386	97,294	100,076	106,397	99,701	93,100	85,097	86,040	90,789
NMD %	51.9%	55.2%	57.0%	55.7%	53.1%	53.9%	53.9%	56.7%	61.5%	65.3%	66.0%	67.1%
Time %	30.1%	26.6%	25.7%	28.4%	31.7%	30.5%	30.3%	27.5%	24.0%	20.8%	20.0%	19.2%
Deposits	186,398	190,678	208,554	223,380	260,032	276,686	295,605	305,289	331,557	351,528	370,650	408,197
Assets	227,323	233,026	252,196	265,848	306,558	327,781	351,031	362,487	387,705	408,225	431,039	472,647



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 1.00%

Simulation # 2
45% into FHLB 1yr Advances @ 1.25%

33% into FHLB 2yr Advances @ 1.45%

22% into FHLB 3yr Advances @ 1.65%

NMS Migration Case Study: Earnings at Risk Impact

Summary ALCO - Earnings Simulation - 12 Month Horizon

06/30/2015

Interest Rate Risk ($'s) Shift Horizon	YTD Annualized	Constant Balance Sheet **	Immediate +400/+400 bp 0 Mo.	Non-Parallel +400/+100 bp 12 Mo.	Parallel -100/ -100 bp 12 Mo.	*Unchanged Rate Scenario*	Parallel +100/+100 bp 12 Mo.	Parallel +200/+200 bp 12 Mo.	Parallel +300/+300 bp 12 Mo.
12 Month Horizon in $'s									
Change in Interest Income *	$21,705	$21,640	5,932,317	2,620,627	(408,645)	124,142	791,681	1,447,138	2,083,984
Change in Interest Expense	$770	$742	7,327,732	2,344,348	(286,752)	(11,784)	485,790	1,068,525	1,755,413
Net Interest Change			(1,395,415)	276,279	(121,893)	135,926	305,891	378,613	328,571
NIC as a % of NII			(6.68)	1.32	(0.58)	0.65	1.46	1.81	1.57

Simulation # 1 (Overnight Borrowings)

Change in Interest Income *	$21,705	$21,640	5,932,317	2,620,627	(408,645)	124,142	791,681	1,447,138	2,083,984
Change in Interest Expense	$770	$742	9,050,359	3,176,989	(255,798)	108,271	811,419	1,575,316	2,409,900
Net Interest Change			(3,118,042)	(556,362)	(152,847)	15,871	(19,738)	(128,178)	(325,916)
NIC as a % of NII			(14.92)	(2.66)	(0.73)	0.08	(0.09)	(0.61)	(1.56)

Simulation # 2 (FHLB Laddered Funding)

Change in Interest Income *	$21,705	$21,640	5,932,317	2,620,627	(408,645)	124,142	791,681	1,447,138	2,083,984
Change in Interest Expense	$770	$742	9,524,601	2,551,354	294,471	582,534	1,014,069	1,506,399	2,069,374
Net Interest Change			(3,592,284)	69,273	(703,116)	(458,392)	(222,388)	(59,261)	14,610
NIC as a % of NII			(17.19)	0.33	(3.36)	(2.19)	(1.06)	(0.28)	0.07

The Baker Group

Summary: Managing IRR, Liquidity & The Bond Portfolio

- Don't Be Complacent, Deploy Excess Liquidity To Fight Margin Erosion
  - The bond portfolio is the only place we can increase margin without hurting the membership
  - Margins continue to compress, it's critical to maximize portfolio earnings while managing risk
  - Fed rate hikes expected to be slowest on record – FF futures don't reach 1.5% before 2019
  - Stay fully invested and manage liquidity needs with FHLB/FNC or by selling short bonds
- 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?
- Review Your IRR Process, Stress Your Assumptions & Simulation Migration
  - Analyze your NMS to determine sensitivities/betas
  - Run an NMS Surge Balance Analysis and simulate impact of NMD migration
- Develop A Written Investment Strategy
  - A written investment strategy, updated quarterly, is the single most important thing you can do to ensure higher performance within acceptable risk parameters
  - Build a portfolio, don't be sold one
  - Security selection is critical – don't chase yields in esoteric bonds. Stick with highly marketable bonds with stable cash flows.
- 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