

Wilary Winn University for Credit Unions

ALM Strategies

Presented by Wilary Winn

Frank Wilary, Principal
Matt Erickson, Director

September 27, 2016

Wilary Winn University for Credit Unions

Today's Presenters

Frank Wilary – *Principal*

Mr. Wilary co-founded Wilary Winn in 2003 and has over twenty years of diversified experience in the financial services industry. His areas of expertise include asset-liability management, capital markets, derivatives, information systems and valuation of illiquid financial instruments. Frank's primary responsibility is to lead the research, development and implementation of Wilary Winn's new business lines. He works to ensure that new products and services meet our firms' high standards and makes the critical determination of whether to buy or build valuation software and how to best utilize the system selected.



Wilary Winn University for Credit Unions

Today's Presenters

Matt Erickson – *Director*

Mr. Erickson leads Wilary Winn's asset liability management (ALM) business line. He consults with ALM clients on interest rate, credit, concentration and liquidity risks as well as capital stress testing, risk-based pricing and real return optimization.

Matt uses his knowledge of credit risk analytics and quantitative analysis skills to strengthen the firm's proprietary valuation models, develop assumption input databases, and track industry-wide performance trends on loans and deposits.



ALM Strategies

Presentation Background

- Inspired by client questions – how do we optimize our balance sheet between risk and return?
 - Wilary Winn evolved our ALM processes to analyze interest rate risk and cohort level credit risk on an integrated basis
 - Wilary Winn learned to evaluate business strategies under base case and adverse economic situations
- Goal of providing solutions – ALM strategy presentations by others are notorious for pointing out challenges without providing meaningful solutions.
- Detail our analytic process – reflect the criteria and methodologies used to evaluate proposed balance sheet changes.

ALM Strategies

Presentation Objective

- Begin with a balance sheet, identify inherent risks, and evaluate business strategies for optimization of risk and return
 - Change investments and loans mix
 - Change loan portfolio mix
 - Increase leverage
 - Add derivatives
 - Change risk profile of the loan portfolio with risk-based pricing strategies
- Analyze business strategies under various interest rate scenarios and under adverse economic scenarios

Wilary Winn University for Credit Unions

ALM Objectives

For purposes of this presentation we are assuming that a credit union wants to increase long term member benefits by maximizing its earnings while maintaining adequately capitalized status even under adverse economic conditions.

Our ALM approach measures interest rate risk and credit risk on an integrated basis.

ALM Strategies

Advantages of incorporating credit loss modeling within the framework of ALM

- Risk-based pricing – adjust yield requirements based upon expected losses at the loan / cohort level based on predictive inputs
- Loss exposure analysis – stress losses based upon changes in economic environment
- Capital stress testing – determine capital to put at risk in pursuit of return and set concentration limits accordingly

Balance Sheet Composition

Balance Sheet - Overall

Asset / Liability Category	Balance	% of Assets
Total Assets	1,250,000,000	100.00%
Total Liabilities	1,137,500,000	91.00%
Equity	112,500,000	9.00%

Balance Sheet Composition

Cash Position & Investment Portfolio

Asset / Liability Category	Balance	% of Assets
Cash and Equivalents	75,000,000	6.00%
Securities:		
Agency MBS	75,000,000	6.00%
Agency CMO	25,000,000	2.00%
Agency callable, step-ups	50,000,000	4.00%
Total Securities	150,000,000	12.00%

Balance Sheet Composition

Loan Portfolio

Asset / Liability Category	Balance	% of Assets
Loans:		
First Mortgage Loans	450,000,000	36.00%
Home Equity Loans	50,000,000	4.00%
HELOC	50,000,000	4.00%
Vehicle Loans	250,000,000	20.00%
Credit Card	100,000,000	8.00%
MBLs	50,000,000	4.00%
Other Consumer	50,000,000	4.00%
Total Loans	1,000,000,000	80.00%

Balance Sheet Composition

Liabilities & Capital

Asset / Liability Category	Balance	% of Assets
Non-Maturity Shares		
Share Drafts	275,000,000	22.00%
Regular Shares	175,000,000	14.00%
Money Market Shares	300,000,000	24.00%
Total Non-Maturity Shares	750,000,000	60.00%
Share Certificates	325,000,000	26.00%
Other Borrowings	37,500,000	3.00%
Other Liabilities	25,000,000	2.00%
Total Liabilities	1,137,500,000	91.00%
Equity	112,500,000	9.00%

Wilary Winn University for Credit Unions

Summary Profile and Objective

44% real estate loans – 36% first lien

20% vehicle

60% non-maturity shares

9% net worth ratio

Goal is to remain well capitalized in an adverse economic environment – unemployment rate of 10.2% and downturn in housing prices of 21.4%

ALM Profile

Net Interest Income Profile

Net Interest Income Profile					
Category	-100	Base	+100	+200	+300
Investments	1,438,275	2,852,600	3,581,775	4,065,575	4,421,175
Loans	45,779,167	47,244,851	48,955,692	50,676,736	52,410,191
Interest Income	47,217,442	50,097,451	52,537,467	54,742,311	56,831,366
Non-Maturing Deposits	1,892,628	3,414,645	5,677,835	7,941,053	10,204,243
Certificates of Deposit	4,605,575	4,969,211	5,354,011	5,738,811	6,123,130
Borrowings	303,098	312,161	597,161	882,161	1,167,161
Interest Expense	6,801,300	8,696,017	11,629,007	14,562,024	17,494,533
Net Interest Income	40,416,142	41,401,434	40,908,460	40,180,287	39,336,833
NII Volatility	-2.38%		-1.19%	-2.95%	-4.99%
ROA	0.98%	1.06%	1.02%	0.96%	0.90%
ROE	10.93%	11.80%	11.36%	10.72%	9.97%
NIM	3.51%	3.60%	3.56%	3.49%	3.42%
Yield on Investments	0.96%	1.90%	2.39%	2.71%	2.95%
Yield on Loans	4.58%	4.72%	4.90%	5.07%	5.24%
Cost of Funds	0.61%	0.78%	1.05%	1.31%	1.57%

ALM Profile

Net Economic Value Profile

Economic Value of Equity Profile					
Category	-100	Base	+100	+200	+300
Cash	75,000,000	75,000,000	75,000,000	75,000,000	75,000,000
Investments	150,597,500	148,802,500	145,365,000	140,637,500	135,490,000
Loans	998,498,000	976,268,000	947,583,000	920,423,000	894,595,500
Other Assets	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000
Total Assets	1,249,095,500	1,225,070,500	1,192,948,000	1,161,060,500	1,130,085,500
Non-Maturing Deposits	739,060,000	715,857,500	696,427,500	680,522,500	668,737,500
Certificates of Deposit	337,057,500	330,330,000	323,375,000	316,680,000	310,245,000
Borrowings	38,954,283	37,968,750	36,755,221	35,615,239	34,541,450
Other Liabilities	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000
Total Liabilities	1,140,071,783	1,109,156,250	1,081,557,721	1,057,817,739	1,038,523,950
Economic Value of Equity	109,023,717	115,914,250	111,390,279	103,242,761	91,561,550
EVE Volatility	-5.94%		-3.90%	-10.93%	-21.01%
EVE Ratio	8.73%	9.46%	9.34%	8.89%	8.10%

Credit Exposure

Credit Losses (base and with economic stress)

Loan Category	Balance	WAC	% of Assets	% of Net Worth	Base Case Credit Losses %	Base Case Credit Losses \$	Max Stress Credit Loss %	Max Stress Credit Loss \$
First Mortgages	450,000,000	3.78%	36.00%	400.00%	1.16%	5,235,000	4.78%	21,500,000
Home Equity Loans	50,000,000	5.56%	4.00%	44.44%	2.19%	1,095,000	8.22%	4,111,500
HELOCs	50,000,000	3.75%	4.00%	44.44%	1.32%	660,500	5.39%	2,693,750
Vehicle Loans	250,000,000	3.56%	20.00%	222.22%	0.80%	1,998,000	1.23%	3,077,150
Credit Card	100,000,000	10.32%	8.00%	88.89%	2.68%	2,680,000	4.02%	4,020,000
MBLs	50,000,000	4.48%	4.00%	44.44%	0.78%	390,000	1.73%	865,000
Other Consumer	50,000,000	5.23%	4.00%	44.44%	2.02%	1,010,000	2.83%	1,414,000
Total Loans	1,000,000,000	4.57%	80.00%	888.89%	1.31%	13,068,500	3.77%	37,681,400

Current Net Worth

9.00%

9.00%

Adjusted Net Worth (Add back existing ALLL)

9.60%

9.60%

Net Worth Ratio After Credit Losses

8.55%

6.59%

Target Net Worth Ratio

7.50%

7.50%

Pass

Fail

What-if Scenarios

Objectives of What-if Scenarios

- Regulatory compliance
- Sensitivity analysis of modeling inputs
- Liquidity stress testing and cash flow monitoring
- Strategic organizational initiatives
 - Annual budgeting
 - Loan and investment portfolio optimization
 - Leverage and growth strategies
 - Funding source optimization
 - Evaluation of risk-based pricing strategies

What-if Scenarios

Scenario Considerations

- Scenarios should be customized for the risk appetite of an organization
- Risks should be measured and analyzed on an integrated basis
 - Interest Rate
 - Credit
 - Concentration
 - Liquidity

What-if Scenarios

Process of Performing What-if Scenarios

- Identify issue or goal
- Recognize there are often many potential solutions leading to an iterative process
- Identify variables and range of adjustments
- Run multiple iterations
- Produce resulting analytics
- Decide on optimal solution

What-if Scenarios

What-if Scenarios Modeled

- Scenario 1 – movement of loans into investments
- Scenario 2 – change in loan mix
- Scenario 3 – leverage strategy
- Scenario 4 – derivative strategy

What-if Scenarios

Objectives of Scenario 1 (Loans to Investments)

- Mitigate credit risk exposure by decreasing concentration in fixed rate mortgages and increasing concentration in Agency MBS
- Decrease credit losses in order to pass max economic stress test
- Recognize change will have little effect on IRR risk profile

What-if Scenarios

Scenario 1 - Loans to Investments								
Asset / Liability Category	Balance	Scenario Changes	Balance	WAC	Base Case Credit Losses %	Base Case Credit Losses \$	Max Stress Credit Loss %	Max Stress Credit Loss \$
Securities:	150,000,000	-	250,000,000	2.18%	0.00%	-	0.00%	-
Agency MBS	75,000,000	100,000,000	175,000,000	2.12%	0.00%	-	0.00%	-
Agency CMO	25,000,000	-	25,000,000	2.27%	0.00%	-	0.00%	-
Agency callable, step-ups	50,000,000	-	50,000,000	2.32%	0.00%	-	0.00%	-
Loans:								
First Mortgage Loans	450,000,000	(100,000,000)	350,000,000	3.73%	0.68%	2,366,000	2.85%	9,960,000
<i>Low Risk</i>	350,000,000	(40,000,000)	310,000,000	3.68%	0.16%	496,000	0.80%	2,480,000
<i>Medium Risk</i>	75,000,000	(45,000,000)	30,000,000	4.06%	3.86%	1,158,000	15.44%	4,632,000
<i>High Risk</i>	25,000,000	(15,000,000)	10,000,000	4.35%	7.12%	712,000	28.48%	2,848,000
Total Assets	1,250,000,000	(100,000,000)	1,250,000,000	3.78%	0.82%	10,199,500	2.09%	26,141,400
Total Liabilities	1,137,500,000	-	1,137,500,000	0.62%				
Equity	112,500,000	(100,000,000)	112,500,000					
Equity Ratio	9.00%		9.00%					
Net Worth Ratio After Lifetime Credit Losses					8.78%		7.51%	
Target Net Worth Ratio					7.50%		7.50%	
					Pass		Pass	
Variance from Current Position								
Lifetime Credit Losses						(2,869,000)		(11,540,000)
Net Worth Ratio After Lifetime Credit Losses						0.23%		0.92%

What-if Scenarios

Scenario 1 - Loans to Investments

Net Interest Income Profile

Category	-100	Base	+100	+200	+300
NII - Scenario	38,280,172	39,359,728	39,053,257	38,371,416	37,666,929
NII Volatility - Scenario	-2.74%		-0.78%	-2.51%	-4.30%
NII - Base	40,416,142	41,401,434	40,908,460	40,180,287	39,336,833
NII Volatility - Base	-2.38%		-1.19%	-2.95%	-4.99%
Variance from Current Position					
NII	(2,135,971)	(2,041,706)	(1,855,203)	(1,808,871)	(1,669,905)
NII Volatility	-0.36%		0.41%	0.44%	0.69%
ROA	-0.17%	-0.16%	-0.15%	-0.14%	-0.13%
NIM	-0.19%	-0.18%	-0.16%	-0.16%	-0.15%
Yield on Investments	0.34%	0.03%	-0.07%	-0.16%	-0.17%
Yield on Loans	0.07%	0.08%	0.09%	0.10%	0.12%

What-if Scenarios

Scenario 1 - Loans to Investments					
Economic Value of Equity Profile					
Category	-100	Base	+100	+200	+300
EVE - Scenario	111,787,717	119,263,250	112,229,279	104,486,761	93,385,550
EVE Volatility - Scenario	-6.27%		-3.18%	-9.86%	-19.44%
EVE Ratio - Scenario	8.93%	9.71%	9.40%	8.99%	8.25%
EVE - Base	109,023,717	115,914,250	111,390,279	103,242,761	91,561,550
EVE Volatility - Base	-5.94%		-3.90%	-10.93%	-21.01%
EVE Ratio - Base	8.73%	9.46%	9.34%	8.89%	8.10%
Variance from Current Position					
EVE	2,764,000	3,349,000	839,000	1,244,000	1,824,000
EVE Volatility	-0.32%	0.00%	0.72%	1.07%	1.57%
EVE Ratio	0.20%	0.25%	0.06%	0.10%	0.15%

What-if Scenarios

Scenario 1 – Loans to Investments Summary

	Current Performance		Scenario 1 - Loans to Investments		Variance	
	Base	+300	Base	+300	Base	+300
Profitability Metrics						
NII	41,401,434	39,336,833	39,359,728	37,666,929	(2,041,706)	(1,669,905)
NII Volatility	-	-4.99%	-	-4.30%	-	0.69%
ROA	1.06%	0.90%	0.90%	0.76%	-0.16%	-0.13%
NIM	3.60%	3.42%	3.42%	3.28%	-0.18%	-0.15%
EVE	115,914,250	91,561,550	119,263,250	93,385,550	3,349,000	1,824,000
EVE Volatility	-	-21.01%	-	-21.70%	-	-0.69%
EVE Ratio	9.46%	8.10%	9.71%	8.25%	0.25%	0.15%
Credit Loss Metrics						
	Base	Max Stress	Base	Max Stress	Base	Max Stress
Credit Loss \$	13,068,500	37,681,400	10,199,500	26,141,400	(2,869,000)	(11,540,000)
Credit Loss %	1.31%	3.77%	0.82%	2.09%	-0.49%	-1.68%
Net Worth (after losses)	8.55%	6.59%	8.78%	7.51%	0.23%	0.92%

What-if Scenarios

Objectives of Scenario 2 (Change in Loan Mix)

- Decrease concentration in fixed rate mortgages to mitigate interest rate risk, liquidity risk, and credit exposure
- Adjust loan mix to pass max economic stress test
- Improve EVE volatility profile to decrease long-term interest rate risk in rising rate scenarios
- Minimize impact to interest income

What-if Scenarios

Scenario 2 - Change in Loan Mix								
Asset / Liability Category	Balance	Scenario Changes	Balance	WAC	Base Case Credit Losses %	Base Case Credit Losses \$	Max Stress Credit Loss %	Max Stress Credit Loss \$
First Mortgage Loans	450,000,000	(100,000,000)	350,000,000	3.74%	0.73%	2,551,000	3.05%	10,692,000
<i>Low Risk</i>	350,000,000	(45,000,000)	305,000,000	3.68%	0.16%	488,000	0.80%	2,440,000
<i>Medium Risk</i>	75,000,000	(40,000,000)	35,000,000	4.06%	3.86%	1,351,000	15.44%	5,404,000
<i>High Risk</i>	25,000,000	(15,000,000)	10,000,000	4.35%	7.12%	712,000	28.48%	2,848,000
Indirect New	75,000,000	50,000,000	125,000,000	3.32%	0.36%	449,500	0.60%	752,650
<i>Low Risk</i>	50,000,000	30,000,000	80,000,000	2.72%	0.03%	24,000	0.05%	36,000
<i>Medium Risk</i>	15,000,000	25,000,000	40,000,000	4.26%	0.28%	112,000	0.62%	246,400
<i>High Risk</i>	10,000,000	(5,000,000)	5,000,000	5.34%	6.27%	313,500	9.41%	470,250
Indirect Used	75,000,000	50,000,000	125,000,000	4.02%	0.42%	529,000	0.71%	891,500
<i>Low Risk</i>	50,000,000	30,000,000	80,000,000	3.36%	0.06%	48,000	0.09%	72,000
<i>Medium Risk</i>	15,000,000	25,000,000	40,000,000	5.08%	0.35%	140,000	0.77%	308,000
<i>High Risk</i>	10,000,000	(5,000,000)	5,000,000	6.20%	6.82%	341,000	10.23%	511,500
Total Assets	1,250,000,000	-	1,250,000,000	3.88%	0.79%	9,914,500	2.10%	26,278,650
Total Liabilities	1,137,500,000	-	1,137,500,000	0.62%				
Equity	112,500,000	-	112,500,000					
Equity Ratio	9.00%		9.00%					
Net Worth Ratio After Lifetime Credit Losses					8.81%		7.50%	
Target Net Worth Ratio					7.50%		7.50%	
					Pass		Pass	
Variance from Current Position								
Lifetime Credit Losses						(3,154,000)		(11,402,750)
Net Worth Ratio After Lifetime Credit Losses						0.25%		0.91%

What-if Scenarios

Scenario 2 - Change in Loan Mix

Net Interest Income Profile

Category	-100	Base	+100	+200	+300
NII - Scenario	40,198,119	41,332,394	40,985,257	40,400,722	39,697,796
NII Volatility - Scenario	-2.74%		-0.84%	-2.25%	-3.95%
NII - Base	40,416,142	41,401,434	40,908,460	40,180,287	39,336,833
NII Volatility - Base	-2.38%		-1.19%	-2.95%	-4.99%
Variance from Current Position					
NII	(218,023)	(69,040)	76,797	220,435	360,963
NII Volatility	-0.36%		0.35%	0.70%	1.03%
ROA	-0.02%	-0.01%	0.01%	0.02%	0.03%
NIM	-0.02%	-0.01%	0.01%	0.02%	0.03%
Yield on Loans	-0.02%	-0.01%	0.01%	0.02%	0.04%

What-if Scenarios

Scenario 2 - Change in Loan Mix					
Economic Value of Equity Profile					
Category	-100	Base	+100	+200	+300
EVE - Scenario	111,498,217	120,238,750	118,604,779	113,107,261	103,921,050
EVE Volatility - Scenario	-7.27%		2.32%	-2.42%	-10.35%
EVE Ratio - Scenario	8.91%	9.78%	9.88%	9.66%	9.10%
EVE - Base	109,023,717	115,914,250	111,390,279	103,242,761	91,561,550
EVE Volatility - Base	-5.94%		-3.90%	-10.93%	-21.01%
EVE Ratio - Base	8.73%	9.46%	9.34%	8.89%	8.10%
Variance from Current Position					
EVE	2,474,500	4,324,500	7,214,500	9,864,500	12,359,500
EVE Volatility	-1.32%	0.00%	6.22%	8.51%	10.66%
EVE Ratio	0.18%	0.32%	0.54%	0.77%	0.99%

What-if Scenarios

Scenario 2 – Change in Loan Mix Summary

	Current Performance		Scenario 2 - Change in Loan Mix		Variance	
	Base	+300	Base	+300	Base	+300
Profitability Metrics						
NII	41,401,434	39,336,833	41,332,394	39,697,796	(69,040)	360,963
NII Volatility	-	-4.99%	-	-3.95%	-	1.03%
ROA	1.06%	0.90%	1.06%	0.93%	-0.01%	0.03%
NIM	3.60%	3.42%	3.59%	3.45%	-0.01%	0.03%
EVE	115,914,250	91,561,550	120,238,750	103,921,050	4,324,500	12,359,500
EVE Volatility	-	-21.01%	-	-13.57%	-	7.44%
EVE Ratio	9.46%	8.10%	9.78%	9.10%	0.32%	0.99%
Credit Loss Metrics						
	Base	Max Stress	Base	Max Stress	Base	Max Stress
Credit Loss \$	13,068,500	37,681,400	9,914,500	26,278,650	(3,154,000)	(11,402,750)
Credit Loss %	1.31%	3.77%	0.79%	2.10%	-0.51%	-1.67%
Net Worth (after losses)	8.55%	6.59%	8.81%	7.50%	0.25%	0.91%

What-if Scenarios

Objectives of Scenario 3 – Leverage Strategy

- Grow loan portfolio by 10% to increase NII and ROA
- Pass net worth stress test in base case economic conditions with 7.5% target
- Pass net worth stress test in max stress economic conditions with 6.0% target
- Minimize impact to ALM volatility profiles
- Use funding consisting of 50% organic growth and 50% borrowings

What-if Scenarios

Scenario 3 - Leverage Strategy								
Asset / Liability Category	Balance	Scenario Changes	Balance	WAC	Base Case Credit Losses %	Base Case Credit Losses \$	Max Stress Credit Loss %	Max Stress Credit Loss \$
First Mortgage Loans	450,000,000	30,000,000	480,000,000	3.77%	1.10%	5,283,000	4.53%	21,740,000
<i>Low Risk</i>	350,000,000	30,000,000	380,000,000	3.68%	0.16%	608,000	0.80%	3,040,000
<i>Medium Risk</i>	75,000,000	-	75,000,000	4.06%	3.86%	2,895,000	15.44%	11,580,000
<i>High Risk</i>	25,000,000	-	25,000,000	4.35%	7.12%	1,780,000	28.48%	7,120,000
Indirect Used	75,000,000	70,000,000	145,000,000	4.19%	0.85%	1,231,500	1.35%	1,957,500
<i>Low Risk</i>	50,000,000	35,000,000	85,000,000	3.36%	0.06%	51,000	0.09%	76,500
<i>Medium Risk</i>	15,000,000	30,000,000	45,000,000	5.08%	0.35%	157,500	0.77%	346,500
<i>High Risk</i>	10,000,000	5,000,000	15,000,000	6.20%	6.82%	1,023,000	10.23%	1,534,500
Total Assets	1,250,000,000	100,000,000	1,350,000,000	3.93%	1.01%	13,583,500	2.87%	38,695,400
Share Certificates	325,000,000	50,000,000	375,000,000	1.48%				
Other Borrowings	37,500,000	50,000,000	87,500,000	0.76%				
Total Liabilities	1,137,500,000	100,000,000	1,237,500,000	0.66%				
Equity	112,500,000	-	112,500,000					
Equity Ratio	9.00%		8.33%					
Net Worth Ratio After Lifetime Credit Losses					7.88%		6.02%	
Target Net Worth Ratio					7.50%		6.00%	
					Pass		Pass	
Variance from Current Position								
Lifetime Credit Losses						515,000		1,014,000
Net Worth Ratio After Lifetime Credit Losses						-0.67%		-0.56%

What-if Scenarios

Scenario 3 - Leverage Strategy

Net Interest Income Profile

Category	-100	Base	+100	+200	+300
NII - Scenario	43,536,719	44,610,276	43,835,279	42,825,746	41,701,477
NII Volatility - Scenario	-2.41%		-1.74%	-4.00%	-6.52%
NII - Base	40,416,142	41,401,434	40,908,460	40,180,287	39,336,833
NII Volatility - Base	-2.38%		-1.19%	-2.95%	-4.99%
Variance from Current Position					
NII	3,120,576	3,208,842	2,926,819	2,645,459	2,364,644
NII Volatility	-0.03%		-0.55%	-1.05%	-1.53%
ROA	0.16%	0.16%	0.14%	0.12%	0.11%
NIM	-0.03%	-0.03%	-0.05%	-0.07%	-0.08%
Yield on Loans	-0.03%	-0.03%	-0.03%	-0.03%	-0.03%
Cost of Funds	0.04%	0.03%	0.05%	0.06%	0.08%

What-if Scenarios

Scenario 3 - Leverage Strategy					
Economic Value of Equity Profile					
Category	-100	Base	+100	+200	+300
EVE - Scenario	110,126,674	117,092,750	112,358,818	104,275,275	92,917,784
EVE Volatility - Scenario	-5.95%		-3.07%	-10.04%	-19.84%
EVE Ratio - Scenario	8.16%	8.85%	8.72%	8.31%	7.61%
EVE - Base	109,023,717	115,914,250	111,390,279	103,242,761	91,561,550
EVE Volatility - Base	-5.94%		-3.90%	-10.93%	-21.01%
EVE Ratio - Base	8.73%	9.46%	9.34%	8.89%	8.10%
Variance from Current Position					
EVE	1,102,956	1,178,500	968,539	1,032,515	1,356,234
EVE Volatility	0.00%	0.00%	0.84%	0.89%	1.17%
EVE Ratio	-0.57%	-0.61%	-0.62%	-0.58%	-0.50%

What-if Scenarios

Scenario 3 – Leverage Strategy Summary

	Current Performance		Scenario 3 - Leverage Strategy		Variance	
	Base	+300	Base	+300	Base	+300
Profitability Metrics						
NII	41,401,434	39,336,833	44,610,276	41,701,477	3,208,842	2,364,644
NII Volatility	-	-4.99%	-	-6.52%	-	-1.53%
ROA	1.06%	0.90%	1.22%	1.01%	0.16%	0.11%
NIM	3.60%	3.42%	3.57%	3.34%	-0.03%	-0.08%
EVE	115,914,250	91,561,550	117,092,750	92,917,784	1,178,500	1,356,234
EVE Volatility	-	-21.01%	-	-20.65%	-	0.36%
EVE Ratio	9.46%	8.10%	8.85%	7.61%	-0.61%	-0.50%
Credit Loss Metrics						
	Base	Max Stress	Base	Max Stress	Base	Max Stress
Credit Loss \$	13,068,500	37,681,400	13,583,500	38,695,400	515,000	1,014,000
Credit Loss %	1.31%	3.77%	1.01%	2.87%	-0.30%	-0.90%
Net Worth (after losses)	8.55%	6.59%	7.88%	6.02%	-0.67%	-0.56%

What-if Scenarios

Objectives of Scenario 4 – Derivative Strategy

- Minimize ALM volatility to rising market interest rates
- Not all credit unions are eligible
 - Federal over \$250 mm in total assets, CAMEL 3 or better (2 or better management)
- Requires policies, internal controls and qualified personnel
- Prior Regulatory approval is required
- Hedge accounting rules are complex
 - FASB project underway to improve (simplify) hedge accounting standards

Wilary Winn University for Credit Unions

Typical Derivative Example – Funding Long Term Fixed Rate Mortgages

Alternative 1: 7 year FHLB advance rate @ 1.75%

Alternative 2: 1 year LIBOR based advance priced at 3 month LIBOR plus 10 bps & 7 year interest rate swap which results in a fixed rate of 1.30%

Benefit: 35 basis points a year for 7 years assuming annual renewal of spread to LIBOR remains constant

Fair Value Profile					
Category	-100	Base	+100	+200	+300
\$80 MM, 7 yr Interest Rate Swap	(5,555,949)	0	5,145,747	9,905,015	14,309,774

Wilary Winn University for Credit Unions

EVE Profile with an Interest Rate Swap

Fair Value Profile				
Category	Base	+100	+200	+300
Cash	75,000,000	75,000,000	75,000,000	75,000,000
Investments	148,802,500	145,365,000	140,637,500	135,490,000
Loans	976,268,000	947,583,000	920,423,000	894,595,500
Other Assets	25,000,000	25,000,000	25,000,000	25,000,000
Total Assets	1,225,070,500	1,192,948,000	1,161,060,500	1,130,085,500
Non-Maturing Deposits	715,857,500	696,427,500	680,522,500	668,737,500
Certificates of Deposit	330,330,000	323,375,000	316,680,000	310,245,000
Borrowings	37,968,750	36,755,221	35,615,239	34,541,450
Other Liabilities	25,000,000	25,000,000	25,000,000	25,000,000
Total Liabilities	1,109,156,250	1,081,557,721	1,057,817,739	1,038,523,950
Economic Value of Equity	115,914,250	111,390,279	103,242,761	91,561,550
EVE Volatility		-3.90%	-10.93%	-21.01%

\$80 MM, 7 yr Interest Rate Swap	0	5,145,747	9,905,015	14,309,774
Economic Value of Equity	115,914,250	116,536,026	113,147,776	105,871,324
EVE Volatility		0.54%	-2.39%	-8.66%

What-if Scenarios

Modeling Methodology

- Instantaneous changes
 - Based on current characteristics of instruments in each category
 - New instruments are added based on current market characteristics
- Growth over-time
 - Align with budgeted annual growth
 - Model a range of growth rates
 - Incorporate account seasonality

What-if Scenarios

Modeling Methodology (continued)

- Process of iterative adjustments
 - Dynamic adjustments and results
 - Individually modeled scenarios through ALM software
- Level of granularity at which adjustments are modeled
 - Aggregate category level versus detailed cohort level
 - Consider usefulness to decision makers across organization

Real Return Analysis

Determined by calculating the internal rate of return of the cash flows received over the life of a loan.

The analysis incorporates:

- Current pricing matrix by FICO and term
- Average loan balance by term
- Indirect dealer fees
- Probability of delinquency and default for FICO and term cohorts
- Lost interest on delinquent loans
- Ultimate credit losses based on modeled default and severity rates

Risk-Based Pricing

Used Vehicle Indirect Pricing Matrix

Vehicle Loan Category	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550
Used Vehicle - Indirect - 24 Month	2.49%	2.99%	3.99%	5.49%	7.49%	11.49%	13.49%
Used Vehicle - Indirect - 36 Month	2.49%	2.99%	4.49%	5.99%	7.99%	11.99%	13.99%
Used Vehicle - Indirect - 48 Month	2.99%	3.49%	4.99%	6.49%	8.49%	12.49%	14.49%
Used Vehicle - Indirect - 60 Month	3.49%	3.99%	5.49%	6.99%	8.99%	12.99%	14.99%
Used Vehicle - Indirect - 72 Month	3.99%	4.49%	5.99%	7.99%	9.99%	13.99%	15.99%
Used Vehicle - Indirect - 84 Month	4.49%	4.99%	6.49%	8.99%	10.99%	14.99%	16.99%

Real Return Analysis

Estimated Real Return - Base Economic Environment							
Vehicle Loan Category	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550
Used Vehicle - Indirect - 24 Month	1.98%	2.35%	3.27%	3.08%	3.89%	3.39%	0.89%
Used Vehicle - Indirect - 36 Month	1.98%	2.30%	3.70%	3.49%	4.39%	3.74%	1.21%
Used Vehicle - Indirect - 48 Month	2.47%	2.74%	4.13%	3.90%	4.89%	4.09%	1.53%
Used Vehicle - Indirect - 60 Month	2.97%	3.18%	4.39%	4.53%	4.50%	4.01%	1.51%
Used Vehicle - Indirect - 72 Month	3.45%	3.51%	4.27%	5.09%	3.62%	3.73%	2.34%
Used Vehicle - Indirect - 84 Month	3.94%	3.84%	4.14%	5.19%	3.73%	4.04%	3.35%

Estimated Real Return - Max Stress Economic Environment							
Vehicle Loan Category	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550
Used Vehicle - Indirect - 24 Month	1.97%	2.24%	3.10%	1.64%	1.57%	-2.31%	-8.19%
Used Vehicle - Indirect - 36 Month	1.96%	2.15%	3.47%	1.99%	2.07%	-2.07%	-8.00%
Used Vehicle - Indirect - 48 Month	2.45%	2.55%	3.85%	2.33%	2.57%	-1.84%	-7.82%
Used Vehicle - Indirect - 60 Month	2.95%	2.94%	3.94%	3.06%	1.51%	-2.36%	-8.23%
Used Vehicle - Indirect - 72 Month	3.42%	3.15%	3.35%	3.28%	-0.79%	-3.59%	-7.52%
Used Vehicle - Indirect - 84 Month	3.90%	3.35%	2.75%	2.72%	-1.34%	-3.80%	-6.51%

Risk-based Pricing What-if Scenarios

Targeted Origination Volume - "Sweet Spot" Scenario								
Vehicle Loan Category	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550	Total
Used Vehicle - Indirect - 24 Month	-	-	-	-	-	-	-	-
Used Vehicle - Indirect - 36 Month	-	-	-	-	-	-	-	-
Used Vehicle - Indirect - 48 Month	-	-	-	-	-	-	-	-
Used Vehicle - Indirect - 60 Month	-	-	7,500,000	7,500,000	7,500,000	-	-	22,500,000
Used Vehicle - Indirect - 72 Month	-	-	7,500,000	7,500,000	7,500,000	-	-	22,500,000
Used Vehicle - Indirect - 84 Month	-	-	7,500,000	10,000,000	7,500,000	-	-	25,000,000
Total - Used Vehicle - Indirect	-	-	22,500,000	25,000,000	22,500,000	-	-	70,000,000

Estimated Real Return								
Scenario	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550	Total
Base Economic Environment	-	-	4.27%	4.96%	3.95%	-	-	4.41%
Max Stress Economic Environment	-	-	3.35%	2.99%	-0.21%	-	-	2.08%

Targeted Origination Volume - Diversified Scenario								
Vehicle Loan Category	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550	Total
Used Vehicle - Indirect - 24 Month	-	-	-	-	-	-	-	-
Used Vehicle - Indirect - 36 Month	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	-	-	12,500,000
Used Vehicle - Indirect - 48 Month	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-	-	25,000,000
Used Vehicle - Indirect - 60 Month	2,500,000	5,000,000	5,000,000	5,000,000	5,000,000	-	-	22,500,000
Used Vehicle - Indirect - 72 Month	-	-	5,000,000	5,000,000	-	-	-	10,000,000
Used Vehicle - Indirect - 84 Month	-	-	-	-	-	-	-	-
Total - Used Vehicle - Indirect	10,000,000	12,500,000	17,500,000	17,500,000	12,500,000	-	-	70,000,000

Estimated Real Return								
Scenario	760+	730 - 759	680 - 729	640 - 679	600 - 639	550 - 599	< 550	Total
Base Economic Environment	2.47%	2.83%	4.18%	4.36%	4.64%	-	-	3.82%
Max Stress Economic Environment	2.45%	2.63%	3.68%	2.76%	2.04%	-	-	2.79%

Risk Based Capital

Risk-Based Capital Considerations



National Credit
Union Administration

Risk-Based Capital Ratio Estimator

Section and Description	Outstanding Balance	Risk Weight	Risk- Weighted Balance
Investments			
Agency and GSE residential MBS or ABS structured securities (excluding IOPOs) ³	\$100	20%	\$20
Loans			
Current 1st lien residential loans comprising less than 35% of assets	\$100	50%	\$50
Current commercial loans comprising less than 50% of assets	\$100	100%	\$100



Risk Based Capital

Risk-Based Capital Considerations

Constant Balance Sheet		FNMA MBS			First Mortgage Loan			Member Business Loan		
	Yield	Assets	Liabilities	Return	Assets	Liabilities	Return	Assets	Liabilities	Return
FNMA MBS	1.75%	\$ 100,000		\$ 1,750			\$ -			\$ -
First Mortgage Loan	3.00%			\$ -	\$ 100,000		\$ 3,000			\$ -
Member Business Loan (1)	4.47%			\$ -			\$ -	\$ 100,000		\$ 4,470
Cost of Funds (2)	0.26%		\$ 98,200	\$ (255)		\$ 95,500	\$ (248)		\$ 91,000	\$ (237)
Required Equity (3)	11.40%		\$ 1,800	\$ (205)		\$ 4,500	\$ (513)		\$ 9,000	\$ (1,026)
		\$ 100,000	\$ 100,000	\$ 1,289	\$ 100,000	\$ 100,000	\$ 2,239	\$ 100,000	\$ 100,000	\$ 3,207

Potential Balance Sheet		FNMA MBS			First Mortgage Loan			Member Business Loan		
	Yield	Assets	Liabilities	Return	Assets	Liabilities	Return	Assets	Liabilities	Return
FNMA MBS	1.75%	\$ 500,000		\$ 8,750			\$ -			\$ -
First Mortgage Loan	3.00%			\$ -	\$ 200,000		\$ 6,000			\$ -
Member Business Loan	4.47%			\$ -			\$ -	\$ 100,000		\$ 4,470
Cost of Funds	0.26%		\$ 491,000	\$ (1,277)		\$ 191,000	\$ (497)		\$ 91,000	\$ (237)
Required Equity	11.40%		\$ 9,000	\$ (1,026)		\$ 9,000	\$ (1,026)		\$ 9,000	\$ (1,026)
		\$ 500,000	\$ 500,000	\$ 6,447	\$ 200,000	\$ 200,000	\$ 4,477	\$ 100,000	\$ 100,000	\$ 3,207

(1) Federal Reserve Board Survey of Business Lending July 15, 2016 Release E-2

(2) Cost of funds for all credit unions quarter ending June 30, 2016 SNL Financial

(3) Duff & Phelps 2016 Quarter 2 Valuation Handbook Guide to Cost of Capital

ALM Strategies

Summary

Incorporating credit loss modeling under both a base case and economically stressed scenarios allows an organization to proactively manage its balance sheet and optimize the balance between return and capital to put at risk in pursuit of returns.

The iterative process of testing business strategies for credit risk impact also serves to strengthen policies (Concentration Risk Policy) and business practices (risk-based pricing).

Services and Contact Information

Asset Liability Management, Capital Stress Testing,
Concentration Risk Analyses, and CECL

Matt Erickson merickson@wilwinn.com

Mergers and Acquisitions, ASC 310-30, Goodwill
Impairment Testing, and TDRs:

Brenda Lidke blidke@wilwinn.com

Servicing Rights and Mortgage Banking Derivatives:

Eric Nokken enokken@wilwinn.com

Non-agency MBS:

Amin Mohomed amohomed@wilwinn.com

Contact Information

Wilary Winn LLC
First National Bank Building
332 Minnesota Street, Suite 1750
Saint Paul, MN 55101
651-224-1200

www.wilwinn.com