

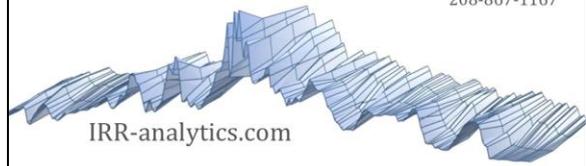
# Interest Rate Risk: A Practical Approach to Risk Management

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## Risk Management Frameworks

What do they tell me about  
ALM at my credit union???



## What does a strong interest rate risk management program look like?

Technical

- Comprehensible policy
- Technically sound model
- Straightforward reporting

Strategic

- Model output interpreted and discussed appropriately
- Discussion results in action or deliberate inaction

## What does a strong interest rate risk management program look like?



Pitfalls: Common weaknesses, oversights, or errors



Advanced: May be applicable only to large, complex, or high-risk credit unions for regulatory purposes, but these techniques represent industry best practices for advanced risk management

# Policy

- Brief overview, assign responsibilities, set policy limits
- Reviewed at least annually
- Can we remove unnecessary narrative or limits?



# Policy Risk Limits

- Should be based on risk to earnings and net worth
  - Earnings simulations and NEV
  - Limits should reflect institution's risk tolerance and financial capacity
- Each institution different based on risk tolerance, structural earnings, and net worth levels
- Do not use NCUA supervisory test parameters as NEV limits
- Are risk limits appropriate?
  - Generic - 10%/20%/30%/40%
  - Precise - 4%/7%/10%/13%



# Policy Risk Limits for Earnings Simulations

- Often based on net interest income at risk
  - Consider “structural” earnings
    - Relationship between net interest income and net income
  - Net income limits should be used if credit union has meaningful levels of rate-sensitive noninterest income (e.g. mtg refinance fees)
- Policy limits should reflect maximum change in net income that the credit union is willing to accept for just interest rate risk



# Policy Risk Limits for Earnings Simulations

Example:

Structural Earnings	Net interest income (no provision)	=	\$40 million
	<u>Noninterest income</u>	=	\$25 million
	Gross profit	=	\$65 million
	Net income	=	\$8.5 million
	Breakeven net interest income at risk (results in net income of zero)	=	21.3% (of \$40 million)



## Policy Risk Limits for Earnings Simulations

- Example:

Breakeven net interest income at risk = 21.3% (of \$40 million)

- Possible appropriate policy limits:

- 10%/15%/20%/25%

- Max policy limits can exceed breakeven depending on net worth and earnings trends

- Calculate years of loss until less than “well capitalized” and determine whether that is adequate time to make adjustments

- 10%/15%/15%/15%

- Limits do not need to increase incrementally

## Policy Risk Limits for NEV

- More difficult to test due to nature of calculations

- What to use as comparison or benchmark?

- Often regulatory net worth used as proxy

- Not a perfect substitute

- Example: Credit union could absorb an immediate 25% reduction in net worth and remain “well capitalized”

- Policy limits may exceed this number, recognizing that net worth will be impacted primarily by earnings over time rather than an immediate fair value adjustment

## Other Policy Risk Limits

- Investments: Maximum maturity, term, WAL, duration, etc.
- GAP: Usually one-year GAP
- Mortgage Lending: Maximum concentration (e.g. < 30% total assets)
  - Weak: “RE Loans”  
(may include HELOC, 15yr, ARMs, etc.)
  - Better: “Fixed 30yr mortgage loans”  
(may include seasoned loans with short remaining maturities)
  - Strong: “Fixed mortgage loans with remaining maturity >20yrs”

## Common Policy Weaknesses



- Policy limits not defined
- Policy limits not highlighted or summarized in table
- Policy limits too permissive or restrictive
- Too few/many policy limits
- Policy measurements and reporting not perfectly aligned
- Policy too long/arcane; nobody actually reads it

## Technical Model Elements

- Core data
- Model input
- Account classifications
- Assumptions
  - Beta/deposit repricing
  - Decay/withdrawal/WAL of NMDs
  - Prepayment
  - Offering rates
- Reporting

## Common Modeling Issues



- Core data
  - Bond accounting
  - Internal core data
  - External core data
    - Credit cards
    - Mortgage/ARMs
    - Auto loan platforms
- Account segmentation
  - Should have common characteristics
- Input settings
  - Noninterest share drafts
    - IB balances < minimum
  - Credit card WAL
    - Nonmaturity product
    - Revolving balances
    - Long WAL = more risk in ↑ rates
  - Indirect auto deferred fees (net)
    - Net yield versus loan coupon rate

## Common Modeling Issues



- **Overly optimistic assumptions**
  - Beta/multipliers/pricing models
    - Benchmark to actual historical pricing in similar rate environments
  - Decay/withdrawal/WAL
    - Valuation premiums < 15%
  - Prepayment speeds
    - Use correct industry standard models
    - Difficult to customize
- **Maintenance overdue**
  - Pricing models
  - Offering rates and terms
  - New products

## Testing Model Output

- **Backtesting**
  - Backward-looking
  - Did the model perform well over the backtest period (usually one year)?
  - Output backtesting performed on earnings simulations
  - No backtesting for NEV
  - Assumptions backtesting evaluates how key assumptions performed
  - Does the model require adjustment?
- **Reasonableness testing**
  - Forward-looking earnings simulations model output
  - NEV output at the reporting date
  - Does the model require adjustment?

# Backtesting

- Simulation-to-actual variance analysis
- Rate variances at account/category level
- Volume variances not relevant for static simulations
- Interpreting backtesting results more difficult during periods with rate changes
- Example below shows a total rate variance, but no category rate variance
  - No model adjustment needed



	Forecasted			Actual			Variance			Variance due to:		
	Balance	Rate	Inc.	Balance	Rate	Inc.	Volume	Rate	Inc.	Volume	Rate	Mix
Fed Funds	2,000	1.75%	35	5,000	1.75%	88	3,000	0.00%	53	53	-	-
Loans	8,000	6.00%	480	5,000	6.00%	300	(3,000)	0.00%	(180)	(180)	-	-
Total	10,000	5.15%	515	10,000	3.88%	388	-	-1.28%	(128)	-	(128)	-

# Reasonableness Testing

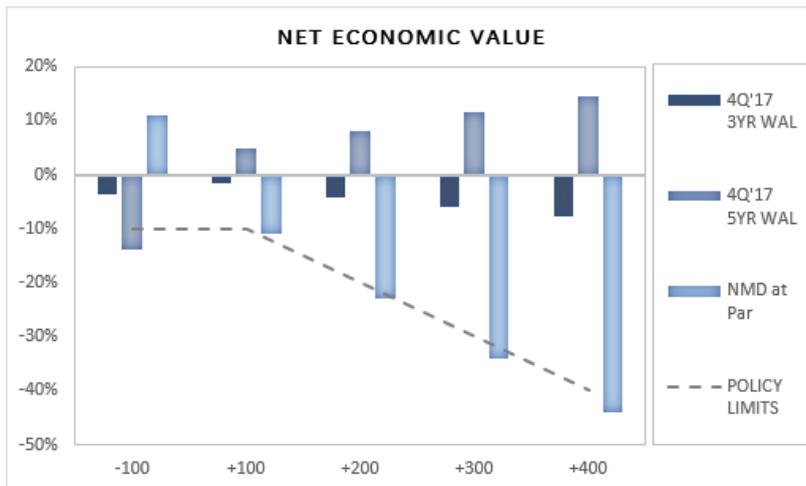
- Earnings simulation yields, costs, and NIM
  - Compare to historical range in comparable rate shifts
  - Base case reasonably close to recent actual performance
- NEV valuations
  - Base case reasonably close to book value
  - Assets within +/-5%, funding within +/-15%, NEV within +/-75% (may change)
  - Implied NEV price volatility compared to benchmarks
    - Benchmarks can often be obtained from bond provider, model vendor, validation firm, etc.
    - e.g. new 30yr fixed mortgage  $\approx$  -20% price volatility in +300bp rate shift (or old 17/4 test)
    - "Rules of thumb" will change based on market rates, seasoning, discounts/premiums, etc.
- Consistency and Symmetry
  - Asymmetry caused by optionality or rate caps/floors (including zero bound)
    - Optionality: Loan prepayments and deposit withdrawals

# Range of Scenarios

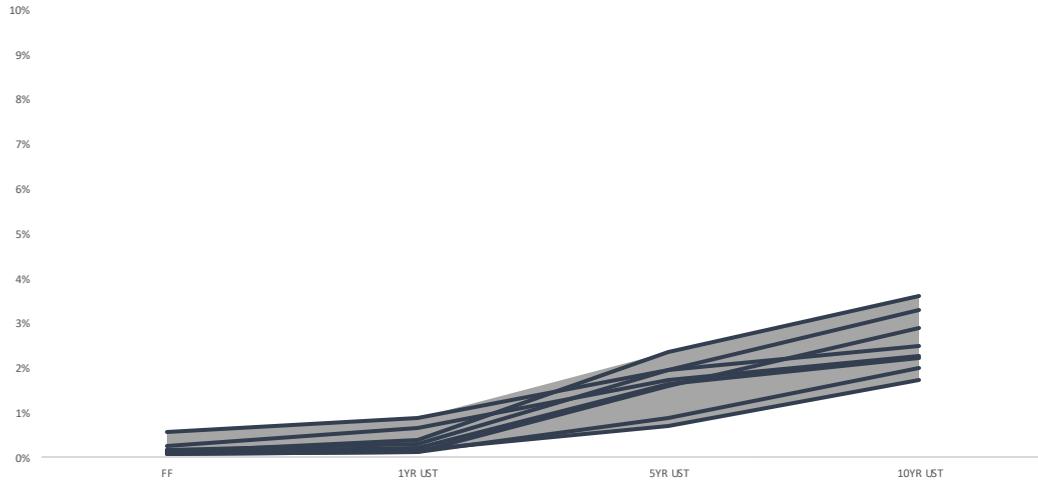
Required

- Sensitivity/stress testing
- Parallel/nonparallel
- Expected rate path (versus flat scenario) 🎓
- Additional stressed scenarios 🎓
  - Adverse loan pricing spreads
  - Change in funding mix
  - Credit stress
    - Ability of members to service debt at higher rates
    - Economic environment?

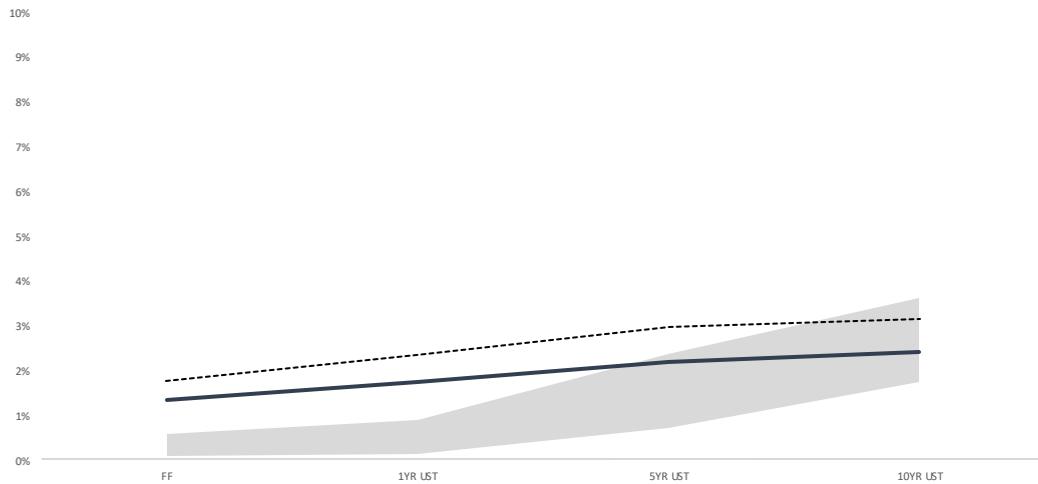
# Actual Decay/WAL Sensitivity Test



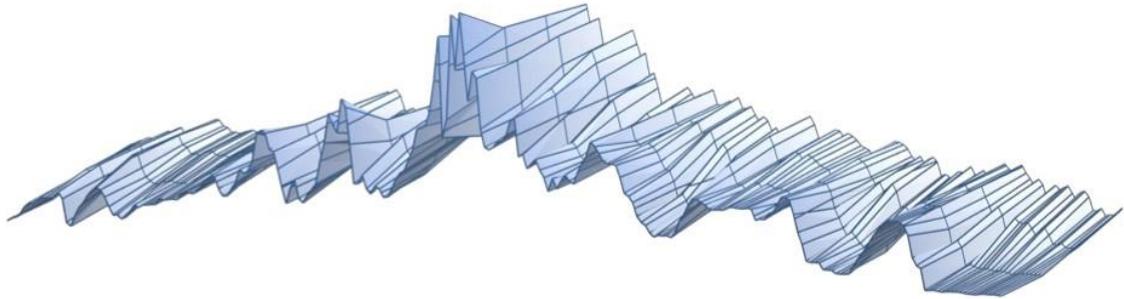
December YC 2009 - 2016



December 2017 (and last week)



## 3D Yield Curve 1954 - 2014



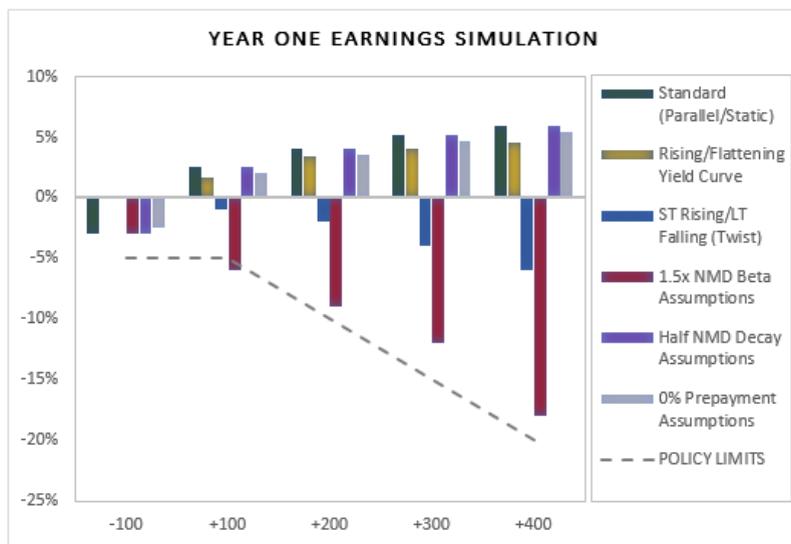
## Reporting

- 5-minute test
  - Exposure, trends, policy compliance
- Packet starts with summary information
- Dashboard reporting for all policy limits on one page
- Graphs and charts
- Detailed output required by guidance (subjective)
- Memos improve communication and documentation
- Frequency
  - Quarterly (min): Regular IRR reporting
  - Annually (min): Special IRR reporting

## Sample Dashboard Report (Section)

	Historical				Current	Policy
	1Q17	2Q17	3Q17	4Q17	1Q18	Limit
EaR Year 1						
-200bp	-14.2%	-10.2%	-8.8%	-6.2%	-7.0%	-15%
-100 bp	-10.1%	-8.1%	-6.7%	-4.0%	-4.3%	-10%
+100 bp	2.0%	1.9%	1.8%	1.9%	2.1%	-10%
+200 bp	3.8%	3.5%	3.2%	3.4%	3.5%	-15%
+300 bp	5.3%	4.2%	4.6%	4.7%	4.9%	-20%
+400bp	5.5%	4.8%	4.9%	5.0%	5.2%	-25%

## Sample Model Output Summary Chart



# Model Output Interpretations and Limitations

- Earnings simulations
  - Static versus dynamic/growth
    - Credit unions can adjust balance sheet allocations
  - Shocks, ramps, and custom rate paths
    - Simulations will never exactly match actual rate path
  - 100% betas on asset reinvestment may be optimistic (spreads)
    - Credit unions can adjust pricing (and volumes) on new production
  - Deposit betas almost certainly wrong
    - Consider a range of possible credit union pricing decisions
  - Risk may exist beyond simulation timeframe
    - e.g. 30yr mortgage funded by 2yr CD in two-year earnings simulation

# Model Output Interpretations and Limitations

- NEV
  - NEV sensitivity indicator of long-term IRR (especially asset sensitivity)
  - Minimum NEV a valuable risk indicator ???
    - e.g. Base case = 200% NW and +400bp = 100% NW (50% sensitivity)
  - Dependent on discount methodology (static, YC, YC+spread, which YC?, etc)
    - Most important to apply consistently
  - NMD valuations (lower = more benefit)
    - Max: Book value (WAL=0; decay=100%)
    - Min: < 80% (depends on WAL and beta)

# Model Output Discussion

- Avoid implications of precision, accuracy, or certainty
- Focus on magnitude and direction of risk
- Acknowledge model limitations and sensitivities
- Quickly move to discussion of actual products, pricing, and business activity

Pitfalls: 

- “If rates rise 200bp, we’re going to make \$783,491 more net income”
- “Rates will never increase 400bp in one year”
- “We’re interest rate risk neutral”
- Converting GAP results into earnings at risk estimate

# Model Output Discussion - Examples

- Investments (including overnight funds)
  - Intent to reduce or extend asset duration?
  - Targeted level of overnight funds?
    - Can be reallocated immediately
    - Reduce overall asset duration
  - Targeted level of bond/CD investment portfolios?
    - Estimated price volatility for marketable securities
    - Cash flow characteristics
  - Marketable securities (i.e. bonds) versus nonmarketable CDs
  - Ability to unwind/sell long positions in adverse conditions
  - Framework for timing and type of investments

# Model Output Discussion - Examples

## • Loans

- Loan structures by portfolio
  - Rate characteristics (i.e. fixed/variable/adjustable)
  - Amortizing, interest-only, revolving
  - Relative duration (i.e. HELOCs=short, autos=medium, 30yr mortgages=long)
- Concentrations and activity/trends
- Possible new product lines, such as MBLs
- Pricing and loan structure adjustments may be slow to impact overall portfolio
- Ability and willingness of members to service debt at higher rates
  - Impact on existing variable rate HELOC or ARM portfolios?
  - Future offering rates at reduced spreads?
- Risks related to fixed rate credit card portfolios
  - Promotional balances
  - Understand process to adjust “fixed” rates (i.e. notice requirements, new balances, etc.)

# Model Output Discussion - Examples

## • Funding

- Levels of noninterest-bearing share drafts
  - Will these balances migrate to interest-bearing products in a rising rate shift?
- Deposit costs relative to the market
  - Higher rates usually mean higher rate sensitivity
- Pricing adjustments of NMDs very quickly impact funding costs
- Are CD early withdrawal penalties appropriate?
  - Example: Rate change breakeven on CD with 48M remaining maturity
    - 1% Rate: Simple interest penalty of 3M is 06bp and 6M is 12bp
    - 2% Rate: Simple interest penalty of 3M is 12bp and 6M is 25bp
- Liquidity levels and dependence on nonmember funding
  - Does the credit union have capacity to lag market rate increases (if needed) and fund some deposit runoff at a reasonable cost?

## Discussion Results in Action or Deliberate Inaction

- Are we managing our risks appropriately?
- Will we survive the next crisis?
  - What might that crisis look like?
    - Big bank stress tests: 7.5% decrease in GDP, 10% unemployment, 65% stock market drop
    - U.S. national debt > \$20T
- What are the tradeoffs for reducing risk?
  - Cost/benefit analysis
- Should we adjust the current balance sheet structure?
- Should we discontinue any products or services?
- Are there new products that could reduce current risk levels?
- Do we need to make a change?

## Advanced Reporting if Elevated Risk is Detected



- Longer-term earnings simulations (and impact on net worth)
- IRR Contingency Plan
  - Show that earnings and net worth adequately support risk
  - Demonstrate ability to respond to adverse conditions
- Action plan to reduce risk, if needed



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