MountainView™
Risk & Analytics
A SitusAMC Company

Asset Liability Management 101 - Part One of Three:

Laying The Foundation For Interest Rate Risk Management

Wednesday, May 26th, 2021

MountainView Risk & Analytics, a SitusAMC Company, provides model risk management services and loan and deposit behavior analytics that enable financial institutions to identify and manage risk.

Formerly McGuire Performance Solutions, MountainView's team of experts empowers our partners to make informed and confident decisions leveraging our unrivaled depth of expertise, dedication, and market knowledge.

Presenters

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Division Head

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Senior Vice President

ALM / IRR Webinar Series 2021

 # 1 - TODAY

Laying The Foundation
For Interest Rate Risk Management

Webinar #2

Building a Sound IRR Model & Testing Assumptions

Date: August 25, 2021

Webinar #3

How Good Governance Strengthens Your Model Framework

Date: November 17, 2021

Goals of the Session

Understanding
Key Drivers of IRR

What Is Interest Rate Risk?

Interest Rate Risk (IRR) is the potential of an increase or decrease in earnings and the market value of equity from changes in market rates.

First, we must…

Understand what drives interest rate risk, and how our institution is positioned for exposure.

- This provides the blueprint to building a proper process or foundation to manage the risk and make good strategic decisions

Where does Interest Rate Risk Come From?

Interest Rate Risk is ***inherent*** in the balance sheet!

IRR arises from the balance sheet through multiple points:

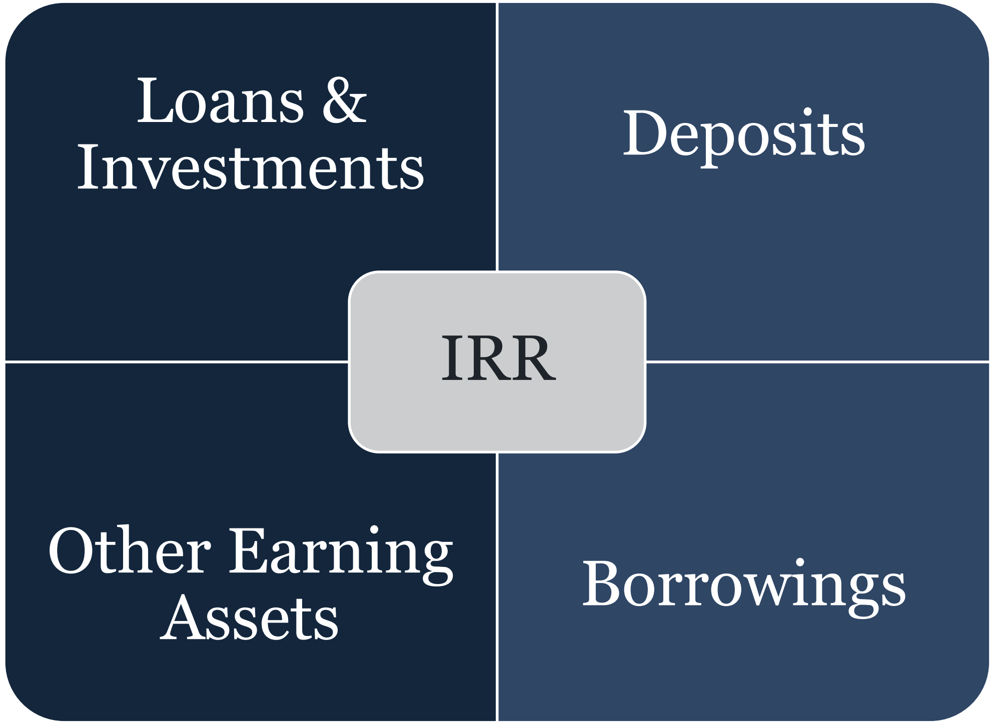
- Repricing or maturity mismatch of assets and liabilities
- Driver rate relationship mismatch
- Optionality (i.e. prepayments, rate caps and floors, CD early withdrawals, calls or puts)
- Non-maturity deposit behavior
- Market and other economic factors

Balance Sheet Sources of IRR

Loans, investments, funding and equity are interrelated building blocks of IRR.

The behaviors of each type of instrument will vary as interest rates change:

- Fixed vs. Variable
- Variable vs. Adjustable
- Long-term vs. Short-term



Types of Risk - Repricing Risk

Repricing Risk = Risk from maturity or repricing **timing** differences between assets and liability cash flows.

Maturity Timing

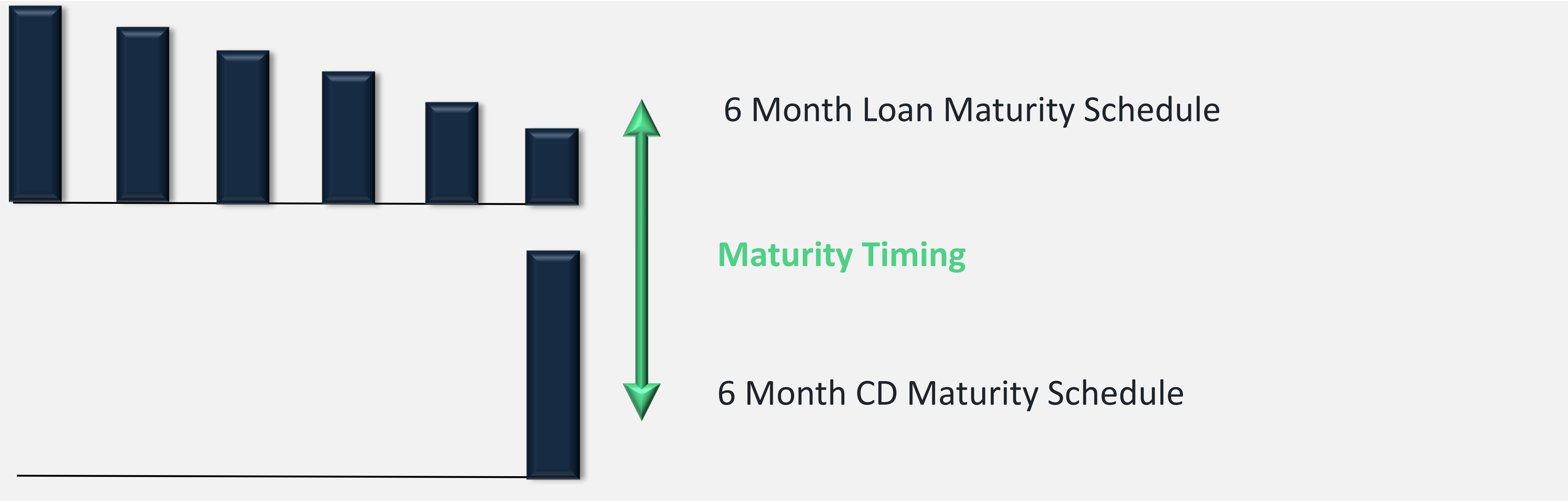
- Includes prepayments.
- Includes average lives or decay rates for non-maturity deposits/shares.

Repricing Gap May be Used for Preliminary IRR

- Considered to be limited use but is easy to calculate and explain.
- Can not measure the impact of options.
- Can not measure basis risk or be used for yield curve twists.

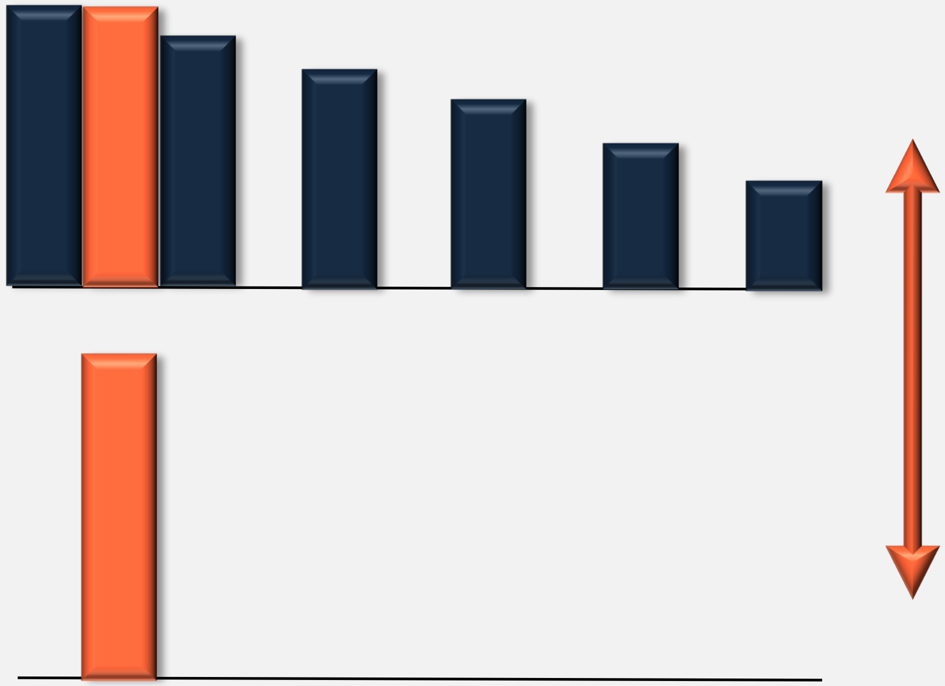
Maturity Gap

Repricing Risk = Risk from maturity or repricing **timing** differences between assets and liability cash flows.



Repricing Gap

Repricing Risk = Risk from maturity or repricing **timing** differences between assets and liability cash flows.



6 Month Loan Maturity Schedule with 1 Month Repricing

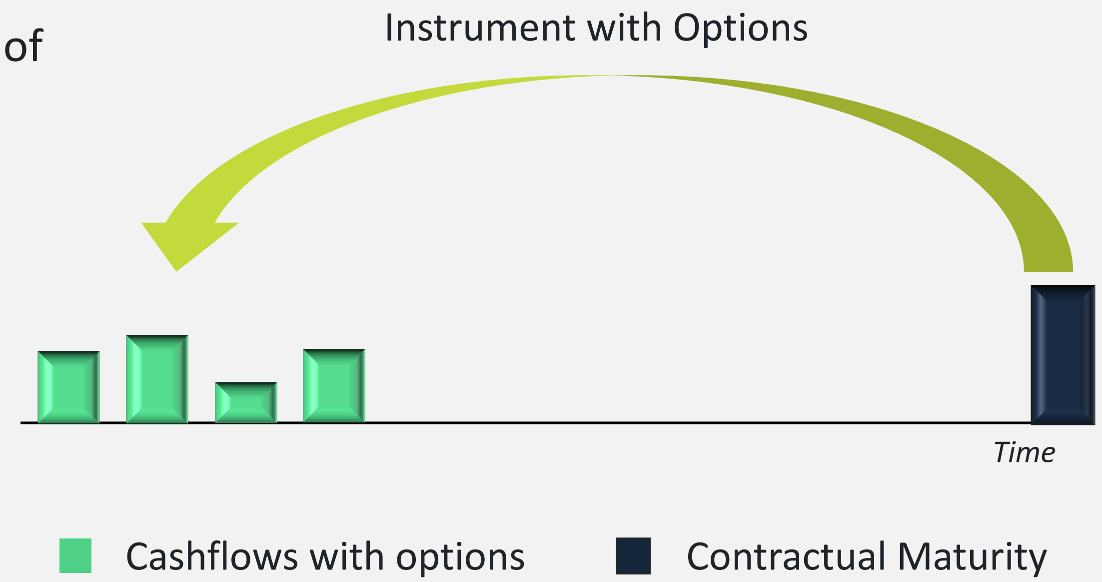
Repricing Timing

Savings (Regular Shares) Category with 1 Month Repricing

Types Of Risk – Option Risk

Option Risk = Risk that is created due to timing differences in the embedded options of the cashflows (i.e. calls, prepayment rates, rate floors.

- Cash flows are redefined due to the activation of options after rate changes.
- Option influences almost always increase IRR.



Foundation of IRR Methodologies

Net Interest Income (NII)

IRR Measurement Methodologies

NII IRR

- Guidance notes regulators continue to believe well-managed institutions will consider earnings and economic perspectives when assessing the scope of their Interest Rate Risk (IRR) exposure.

- Earnings-at-Risk (NII IRR)
  - Covers the tactical short-term exposure
  - One to two years of a forecast
  - Considered to be a dynamic measurement

NII IRR Modeling Standard Practice

Goal of Net Interest Income (NII) IRR analysis is to identify the risk in the current balance sheet solely attributable to changes in interest rates.

Standard Practice Application for Policy Reporting	
Baseline Interest Rates	Employs a constant current spot rate projection • Avoids an extra degree of complexity embedded in forecasted rates
Scenario Interest Rates	Parallel and Instantaneous Rate Shocks
Balance Sheet	NII measured based on a **Static** balance sheet • Avoids added difficulty in assessing IRR risk separately from effects of size, mix, or other changes

Preferred reporting for trend analysis

Earnings at Risk – Policy Measurement

Goal of Net Interest Income (NII) IRR analysis is to measure the change in net interest income across the rate scenarios to determine earnings at risk.

EAR Volatility = % Change from Base

Net Interest Income

	-100	Base	+100	+200	+300	+400
Interest Income	156,000	162,000	170,000	177,800	185,400	192,900
Interest Expense	6,500	7,800	13,000	18,500	24,200	30,100
Net Interest Income	149,500	154,200	157,000	159,300	161,200	162,800
Change from Base	*(4,700)*		*2,800*	*5,100*	*7,000*	*8,600*
% Change from Base	*-3.05%*		*1.82%*	*3.31%*	*4.54%*	*5.58%*
Policy	-5.00%		-5.00%	-10.00%	-15.00%	-20.00%

Earnings / Capital at Risk

Capital Growth – Addtl Deployment

Earnings at Risk – Policy Reporting

STATIC REPORTING

PROS	CONS

PROS

Preferred for Policy Measurement

- Consistency
- Limited variables
- Limits the drivers of change to:
  - Balance Sheet structure
  - Spot Curve
  - New Business Assumptions

CONS

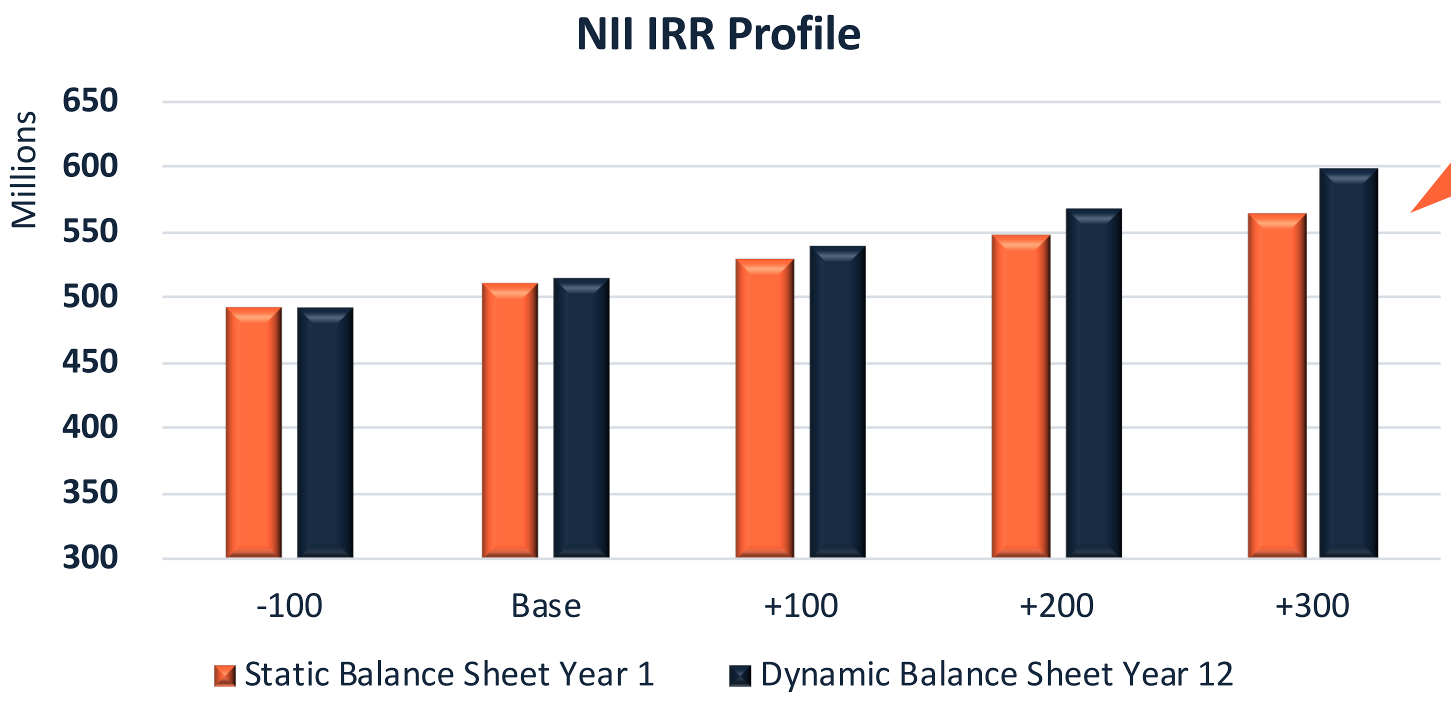
Unrealistic

- Parallel Rate Change
- Static Balance Sheet
- Time Horizon

Earnings At Risk Management

Dynamic IRR provides more realistic modeling including:

- Expected rate changes; i.e. forward curves, rate ramp
- Forecasted balance sheet, growth and mix change



Dynamic Modeling used for strategic management

Earnings at Risk

DYNAMIC IRR REPORTING

PROS	CONS

PROS

- Ability to produce realistic balance sheet forecasts
- Layer in strategic initiatives
- Quantify amount of risk change due to implemented strategies (what-if analysis)
- Growth forecasts will typically reduce IRR exposures, more realistic

CONS

- Forecasted balance sheet can change one quarter to next
  - limiting trend analysis

IRR Modeling Time Horizon

- Regulatory guidance requires earning forecasts be conducted over a one- and two-year period (at a minimum).
- Longer term forecast periods capture the impact of optionality on a contractual and non-contractual basis.

Static Balance Sheet – Year 1			
	NII	Change %	Policy Limits
-100	17,600,000	-1.68%	-5.00%
Base	17,900,000		
+100	18,125,000	1.26%	-5.00%
+200	18,500,000	3.35%	-10.00%
+300	18,850,000	5.31%	-15.00%
+400	19,120,000	6.82%	-20.00%

Static Balance Sheet – Year 2			
	NII	Change %	Policy Limits
-100	16,760,000	-4.23%	-6.00%
Base	17,500,000		
+100	18,300,000	4.57%	-6.00%
+200	19,300,000	10.29%	-12.00%
+300	20,225,000	15.57%	-18.00%
+400	20,920,000	19.54%	-24.00%

Poll

When Reporting IRR Results To The Board/ALCO What Type Of Forecasts Are Used?

Understanding IRR Results

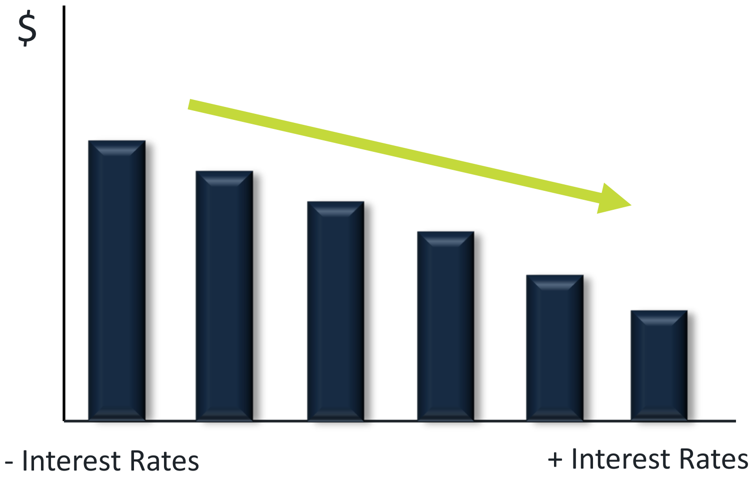
How Balance Sheet Structure Drives Risk

Earnings At Risk Sensitivity

Unequal interest rate changes in interest income and expense create NII IRR.

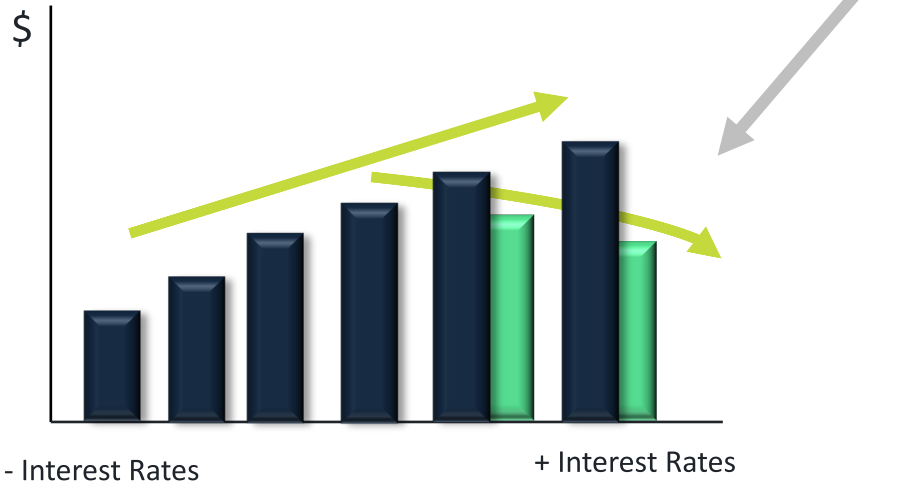
Current position structure of the balance sheet determines the profile (Fixed vs. Variable and Short term vs. Long term)

Indirect NII IRR



Changes in interest expense dominate

Direct NII IRR



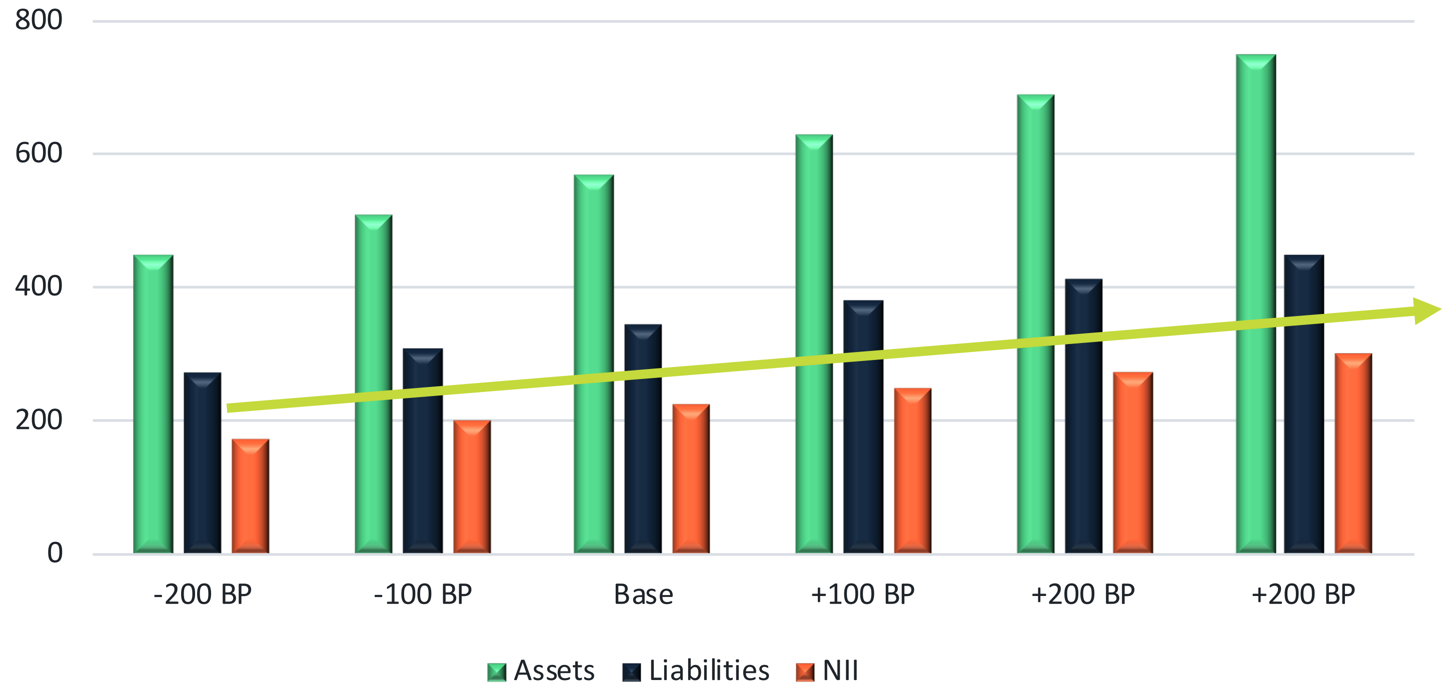
Changes in interest income dominate

NII Profiles may be arched if option influences on shorter term cash flows are significant enough.

Earnings At Risk Sensitivity – Direct NII IRR

Direct IRR Profile = Asset Sensitive Balance Sheet

- As rates increase earnings increase
- Exhibit's assets reprice faster than liabilities or asset sensitivity
- Changes in interest income dominate



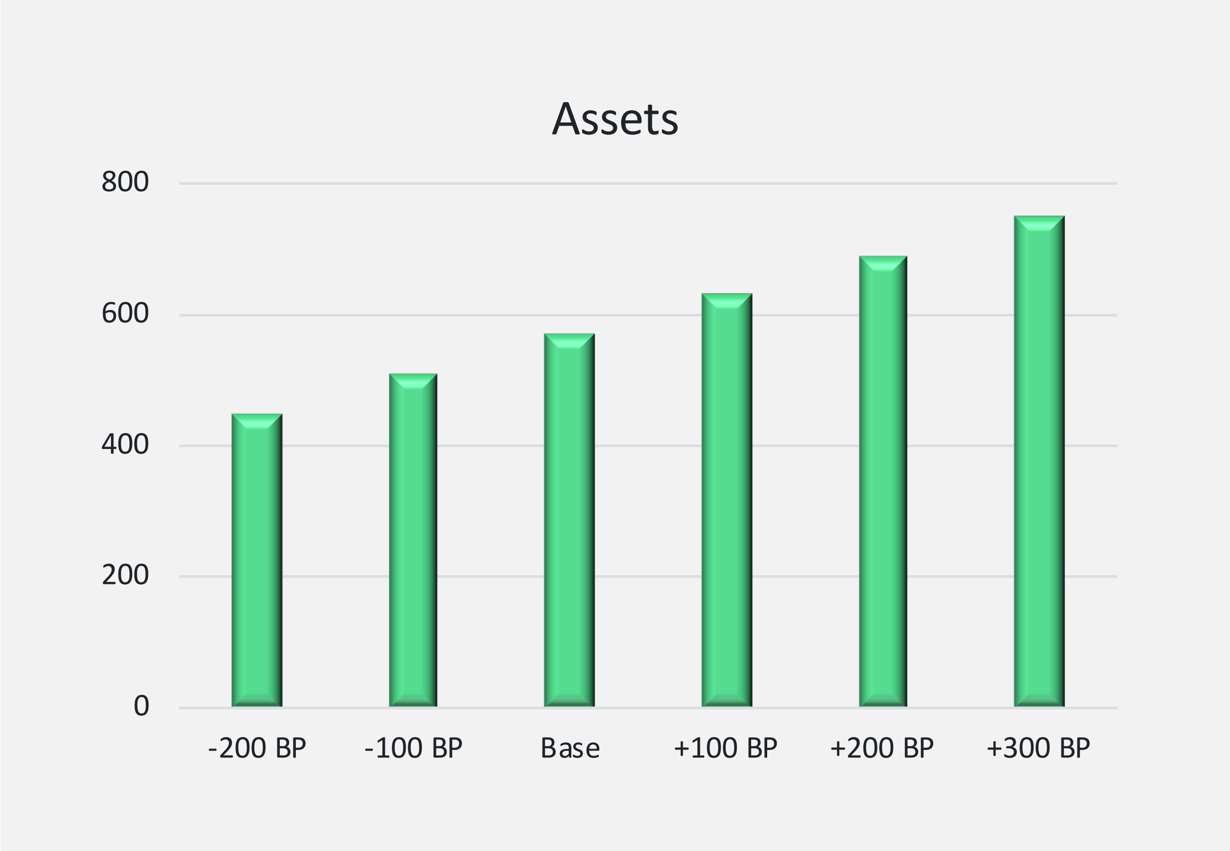
Direct NII IRR / Asset Sensitive

Direct NII IRR Profile / Asset Sensitive

Typical Balance Sheet: Assets

Majority of the assets are repricing or maturing over short term

- Large variable rate portfolio for loans and/or investments
- Reprice linearly, lack of options
- Short-term fixed rate loans
- Consistent prepayments

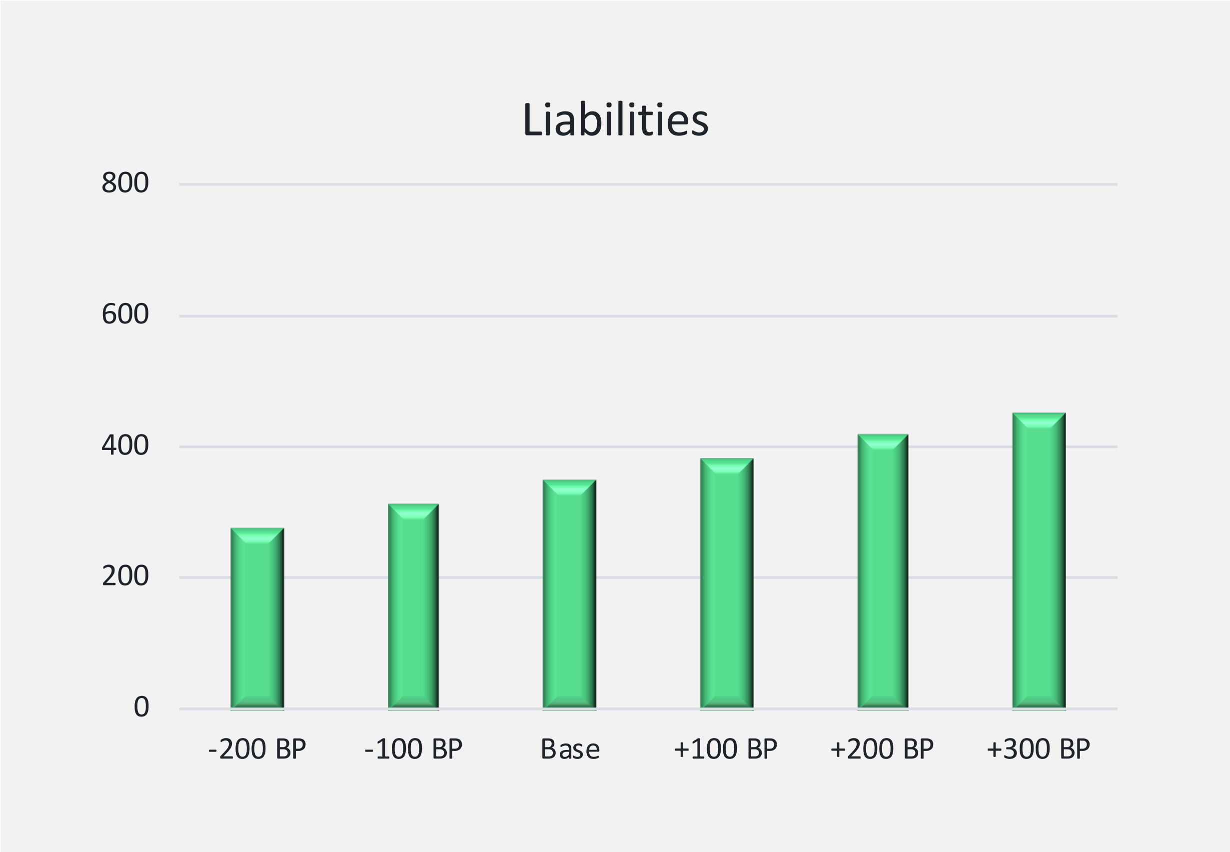


Direct NII IRR Profile / Asset Sensitive

Typical Balance Sheet: Liabilities

Majority of the liabilities are less rate sensitivity, fixed and long-term

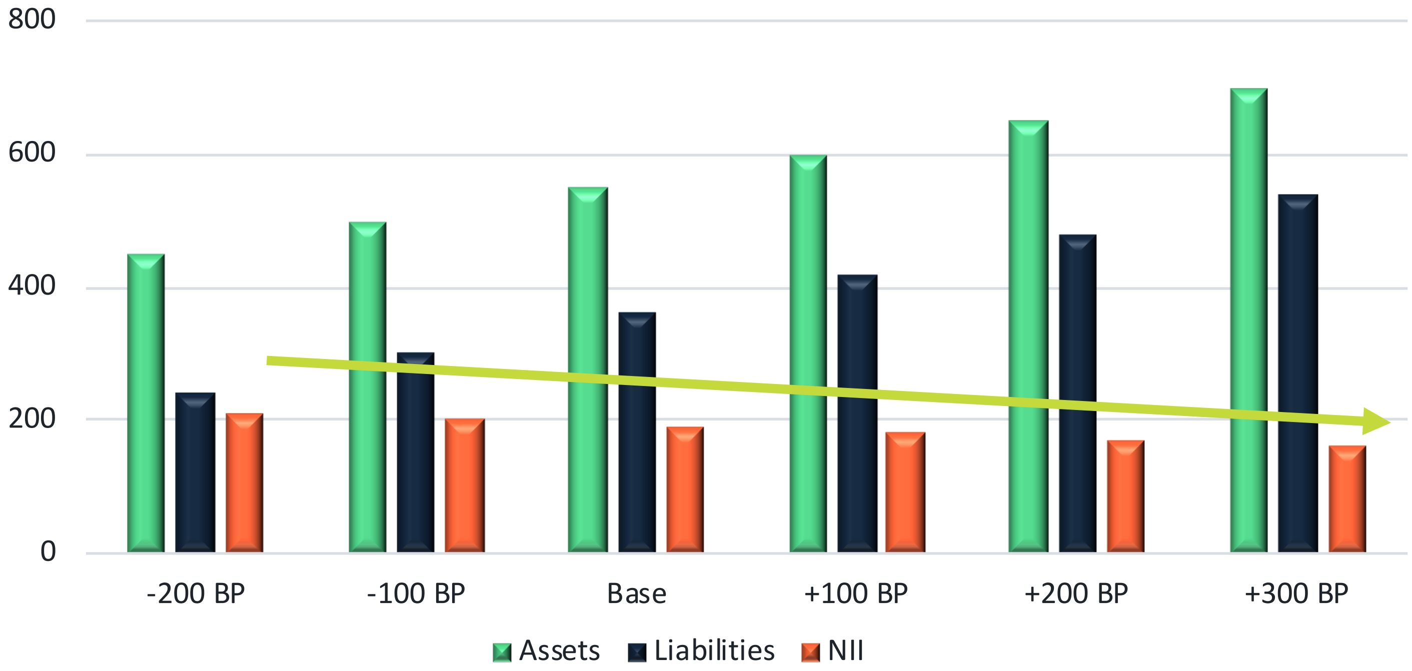
- Large product volumes of less sensitive non-maturity deposits/shares (lower betas)
- Large portfolio of CDs with longer terms
- Fixed rate wholesale borrowings



Earnings At Risk Sensitivity– Indirect NII IRR

Indirect IRR Profile = Liability Sensitive Balance Sheet

- As rates increase earnings decrease
- Liabilities reprice faster than assets or liability sensitivity
- Changes in interest expense dominate



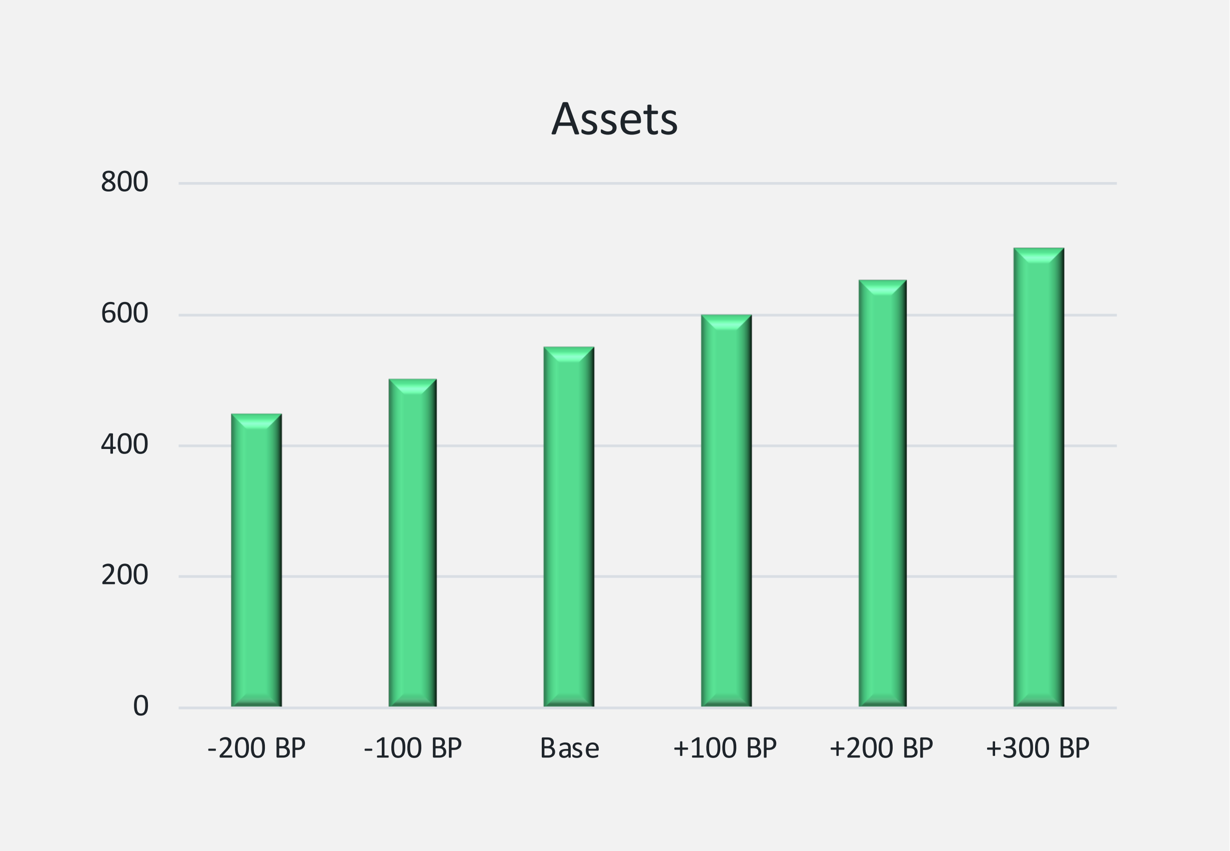
Indirect NII IRR / Liability Sensitive

Indirect NII IRR Profile / Liability Sensitive

Typical Balance Sheet: Assets

Majority of the assets are fixed and/or longer term

- Large fixed rate portfolio for loans and/or investments
- Less cash flows to be replaced at higher rates
- Adjustable-rate loans with longer repricing (Hybrid ARMs)

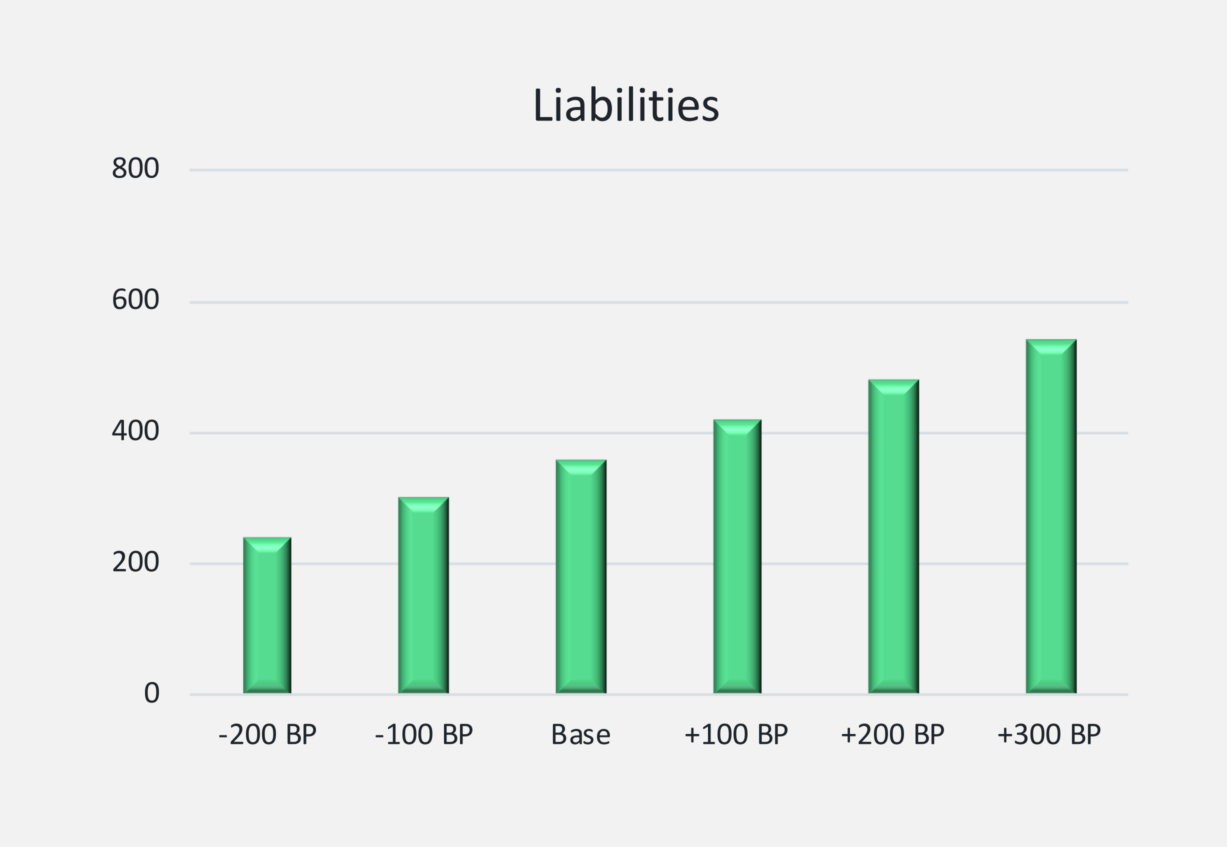


Indirect NII IRR Profile / Liability Sensitive

Typical Balance Sheet: Liabilities

Majority of the liabilities are more rate sensitive, variable and short-term

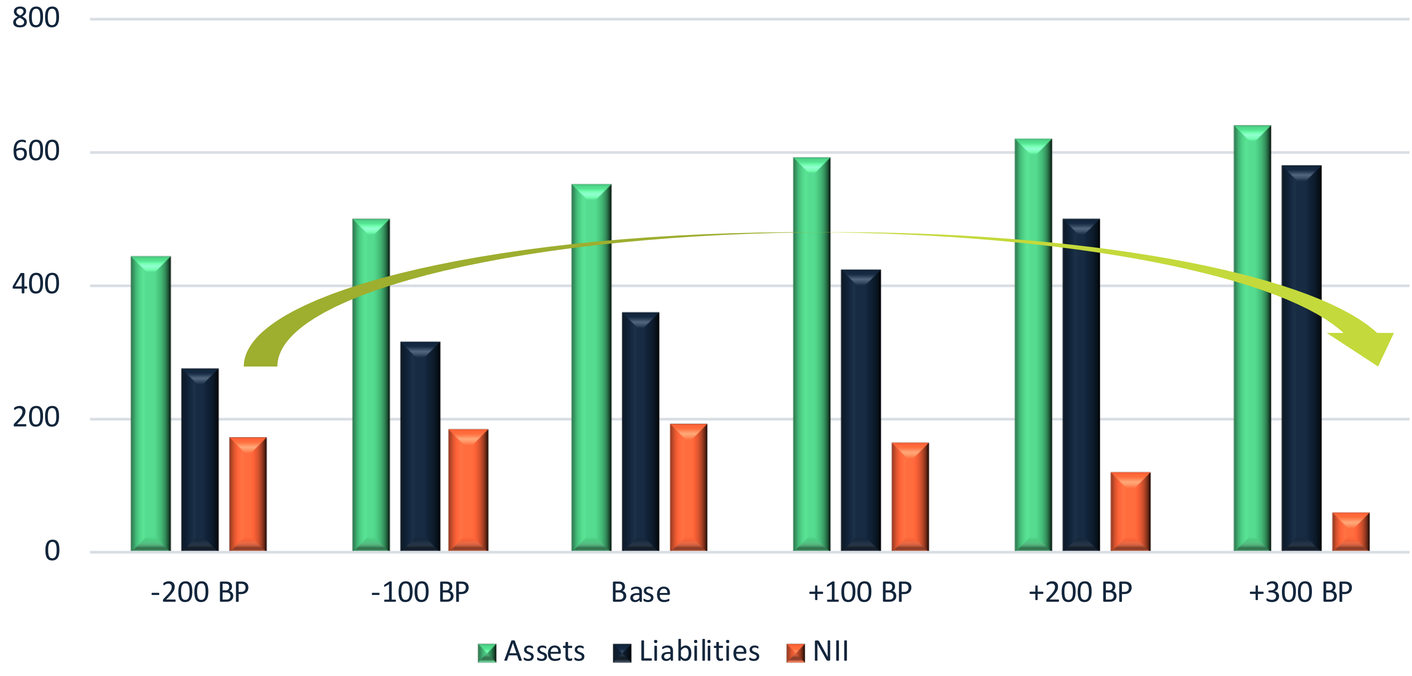
- Large product volumes of more sensitive non-maturity deposits/ shares (MMDAs)
- Large portfolio of short-term CDs
- Variable rate wholesale borrowings or short-term fixed



Earnings At Risk Sensitivity– Impact Of Options

Arched Profile

- As rates increase earnings decrease, changes in interest expense dominate
- As rates decrease earnings decrease, changes in interest income dominate



Arched NII IRR

NII IRR Profile / Impact Of Options

Typical Balance Sheet: Assets

Optionality is evident with non-linear results

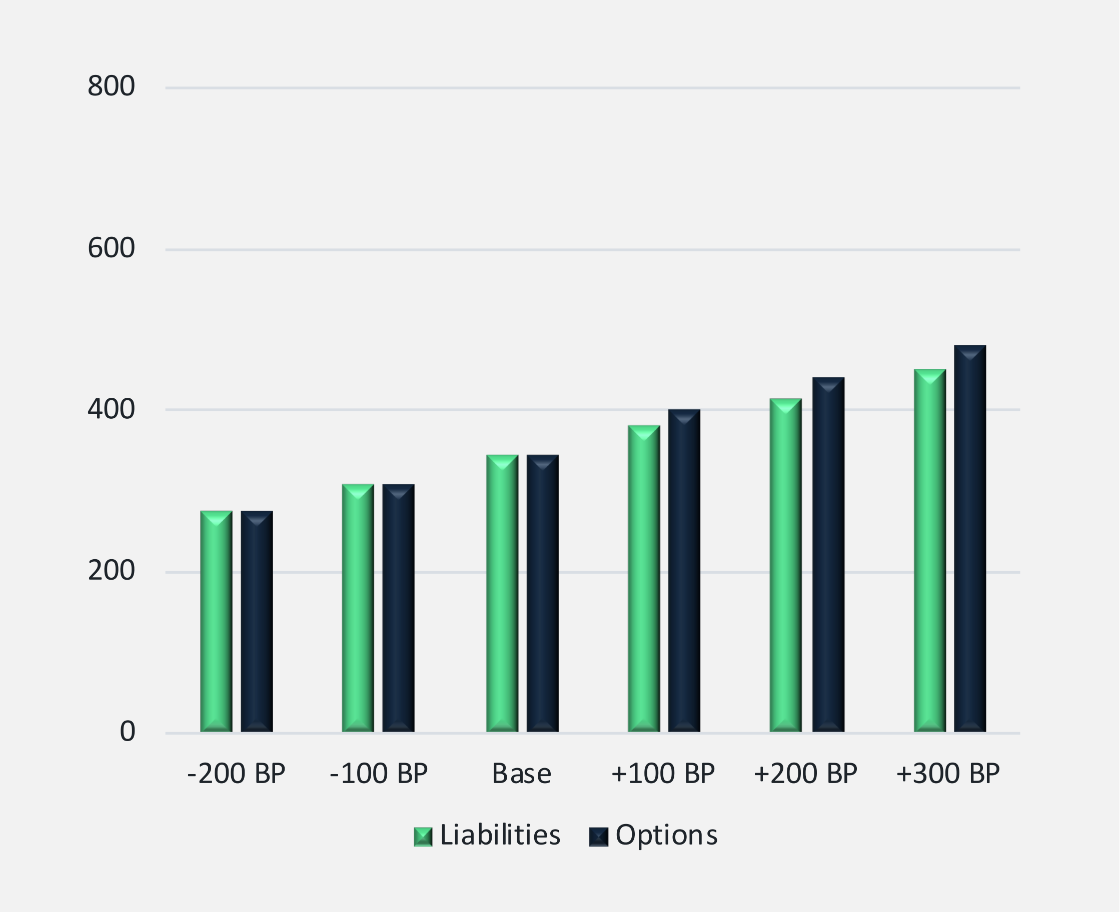
- As interest rates rise prepayments decrease and less marginal cash flows reprice
  - Mortgages/HELOCs
  - MBS/CMOs
- Caps on loans restrict repricing as rates increase
- Floors on loans restrict repricing as rates decrease

NII IRR Profile / Impact Of Options

Typical Balance Sheet: Liabilities

Optionality is evident with non-linear results

- As interest rates rise supply demand increases causing non-linear beta assumptions for non-maturity deposits/shares
- CD withdrawals increase as rates rise causing additional cash flows to reprice at higher rates



Foundation of IRR Methodologies

Economic Value of Equity (EVE)

or Net Economic Value (NEV)

IRR Measurement Methodologies

EVE or NEV IRR

- Guidance notes regulators continue to believe well-managed institutions will consider earnings and economic perspectives when assessing the scope of their Interest Rate Risk (IRR) exposure.

- Equity-at-Risk (EVE or NEV)
  - Covers the strategic / long-term exposures at a fixed point in time (T0).
  - Snapshot in time – Based upon the current balance sheet and related cash flows.
  - Captures the impact of interest rate changes on the value of all future cash flows.

NII IRR Modeling Standard Practice

EVE or NEV measures the effect of interest rates on the market value of equity (net worth) by calculating:

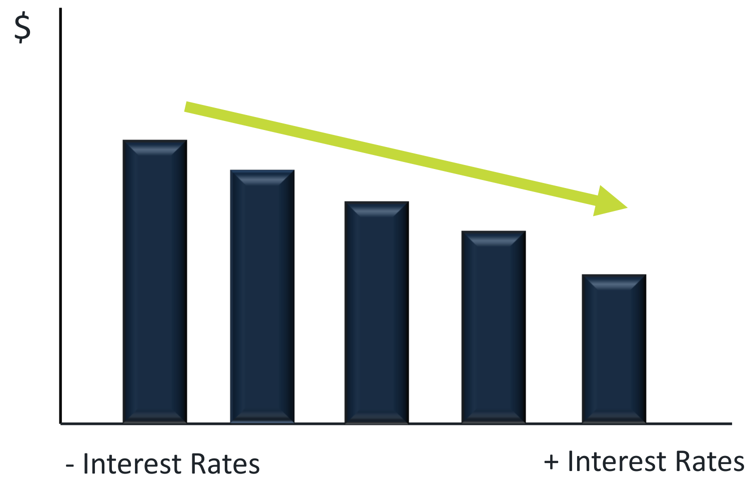
Present value of assets – Present value of liabilities = EVE/NEV

Instrument Description	Market Value Impact to Changes in Interest Rates
Variable Rate	Typically, prices at Par across rate scenarios – • Cash flows are short term • Repriced to market • Minimal impact to market value as interest rates change
Fixed Rate	Market value will decrease, as market rates move higher than the current coupon causing loss of market value
Options	Options add additional loss of marginal value as cash flows extend further as rates increase

Equity At Risk Sensitivity

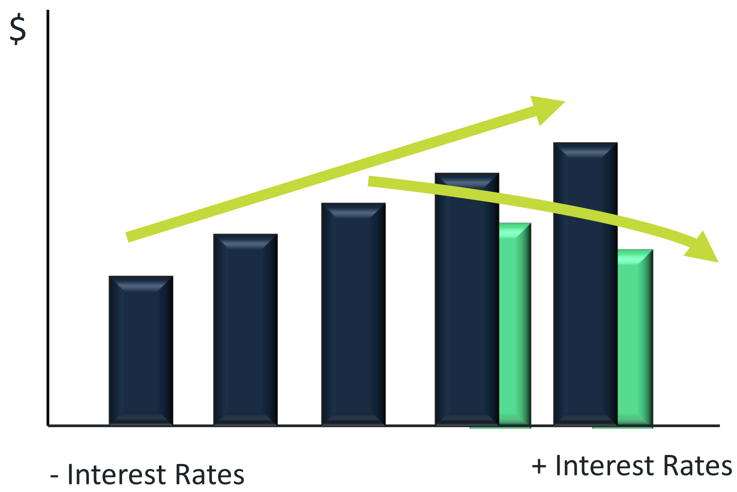
EVE/NEV profiles may be indirect or direct.

Indirect EVE/NEV IRR



Changes in asset present values dominate

Direct EVE/NEV IRR



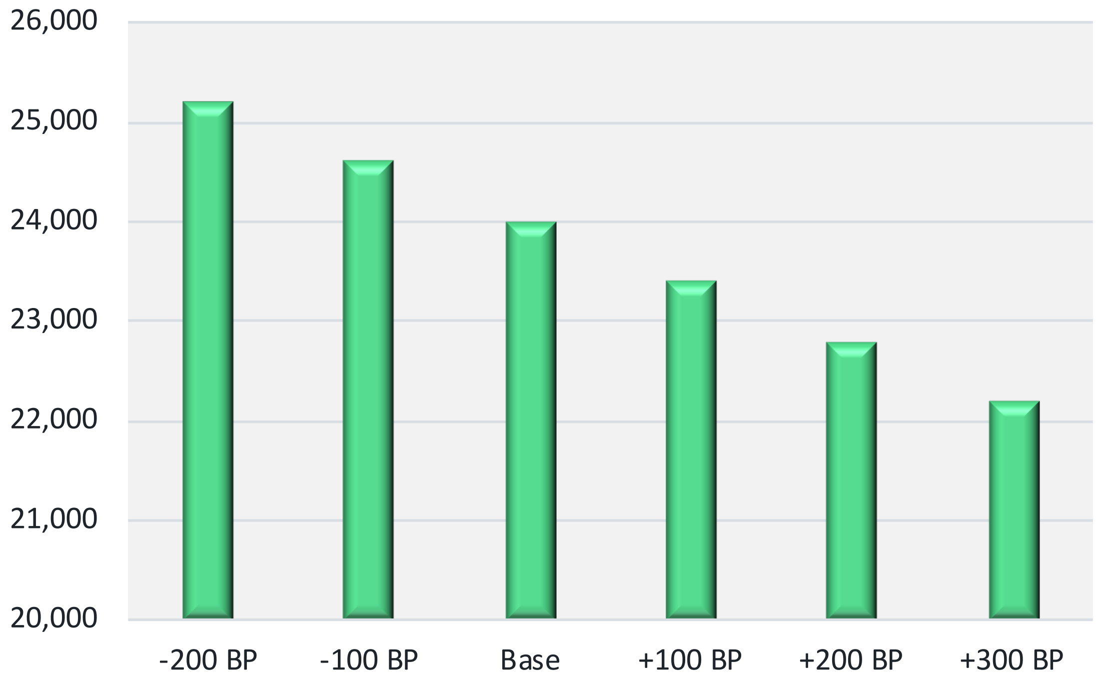
Changes in liability present values dominate

EVE/NEV Profiles may be arched if option influences on longer term cash flows are significant enough.

Indirect EVE (NEV) IRR Profile

Equity Values Decline as Rate Rise.

- Large fixed rate portfolio for loans and investments
- Longer term assets
- Optionality in assets
- Shorter average lives
- Shorter term CDs/wholesale



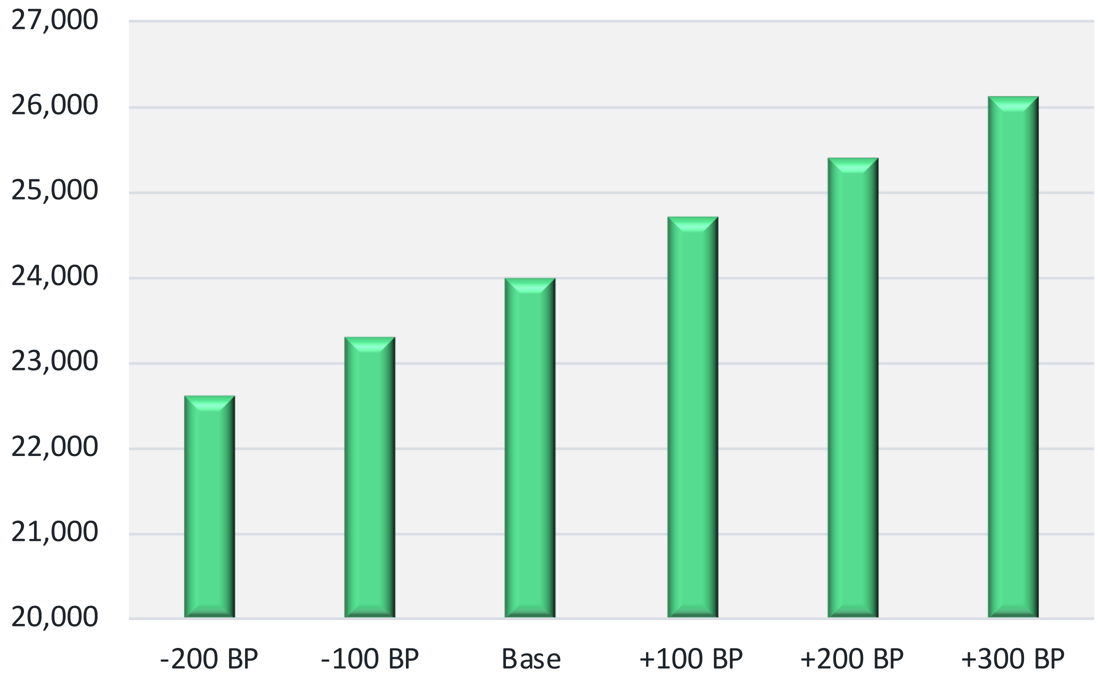
Changes in assets dominate all rate scenarios.

	-200	-100	Base	+100	+200	+300
Economic Value of Equity	25,200	24,600	24,000	23,400	22,800	22,200
Percent Change from Base	5.00%	2.50%		-2.50%	-5.00%	-7.50%

Direct EVE (NEV) IRR Profile

Equity Increases as Rates Rise.

- Large variable rate portfolio in loans or investments
- Limited optionality
- Longer average lives on non-maturity deposits/shares
- Longer term CDs



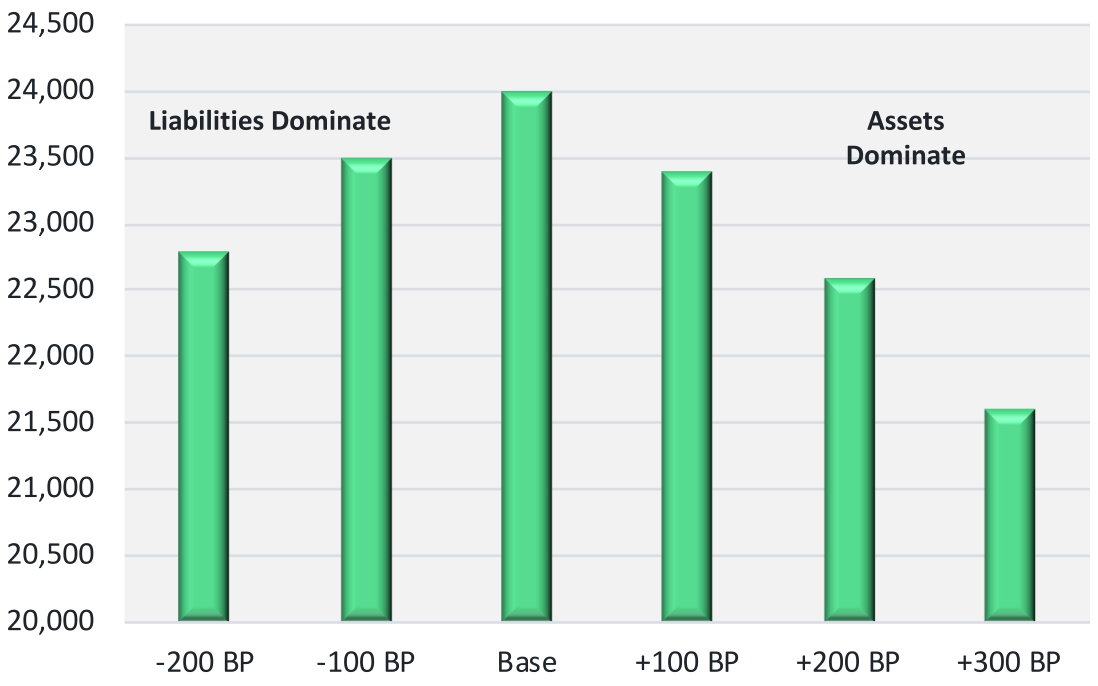
Changes in liabilities dominate all rate scenarios.

	-200	-100	Base	+100	+200	+300
Economic Value of Equity	22,600	23,300	24,000	24,700	25,400	26,100
Percent Change from Base	-5.83%	-2.92%		2.92%	5.83%	8.75%

Arched EVE (NEV) IRR Profile

Equity is at the highest point for the Base Case scenario.

- Optionality in fixed rate loans and investments
- Pricing options in variable / adjustable-rate loans
- CD Early Withdrawals



	-200	-100	Base	+100	+200	+300
Economic Value of Equity	22,800	23,500	24,000	23,400	22,600	21,600
Percent Change from Base	-5.00%	-2.08%		-2.50%	-5.83%	-10.00%

Exploring Additional Risks

Yield Curve and Basis Risk

Risk Measures

Policy measures –

NII and EVE/NEV Rate Shocks

Helps management understand trends due to balance sheet changes

Assess exposures to rates

Dynamic measures for NII

Helps management understand more realistic exposures

Important for strategic management – new products, purchases / sales or hedging strategies

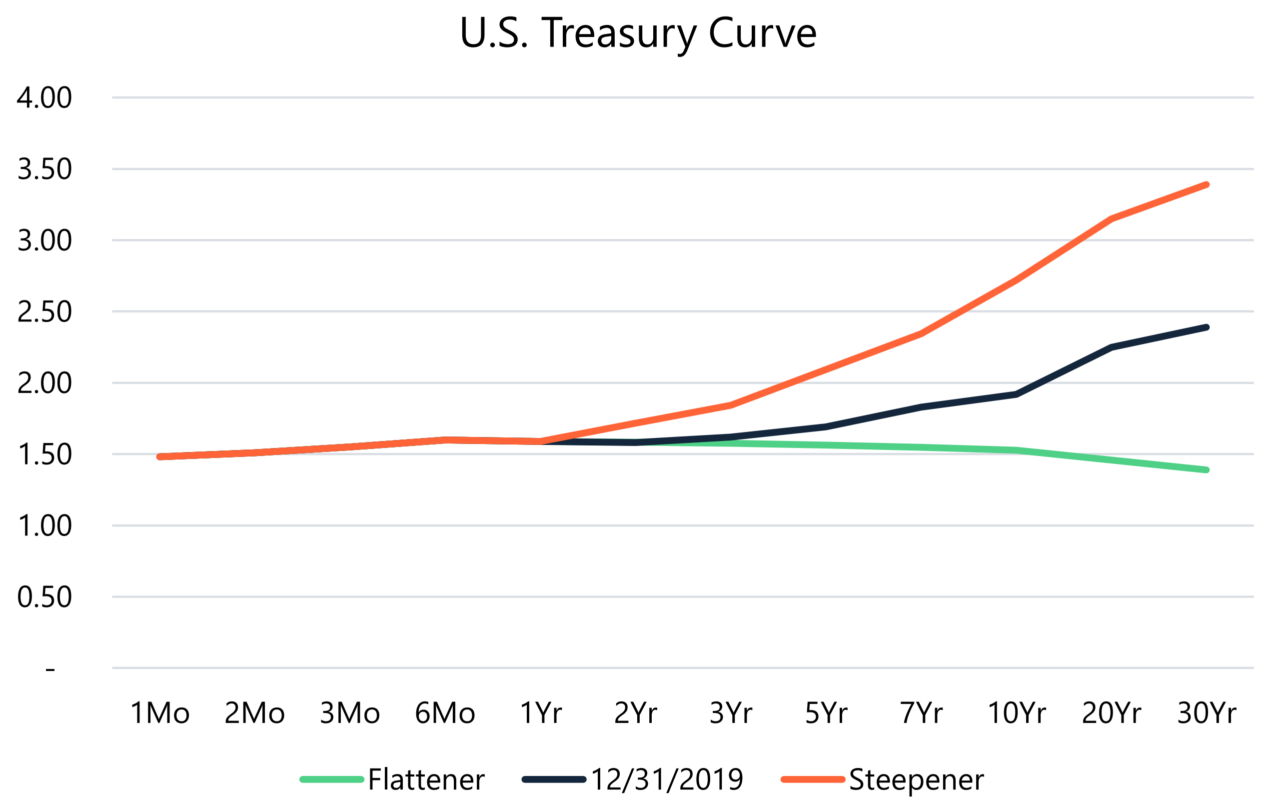
Assess risk exposure to points on the curve and repricing indices.

Yield Curve Risk

Yield Curve Risk = Risk that arises from non-parallel shifts of the yield curve.

Based on the Institution's balance sheet, changes in the shape of the curve can adversely impact earnings

Institution needs to quantify their exposure to this risk or understand where risks are greatest



Yield Curve Risk

Assess exposure to short-term vs. long-term rates

BULL		BEAR	
Steepening	**Flattening**	**Steepening**	**Flattening**
Short term rates decrease by more than long term rates	Long term rates decrease by more than short term rates	Long term rates increase by more than short term rates	Short term rates increase by more than long term rates

	-25 Bp / Quarterly		Base	+25 Bp / Quarterly	
	Bull Steep	Bull Flat		Bear Steep	Bear Flat
Economic Value of Equity	540	520	500	490	450
Percent Change from Base	8.00%	4.00%		-2.00%	-10.00%

Types Of Risk– Basis Risk

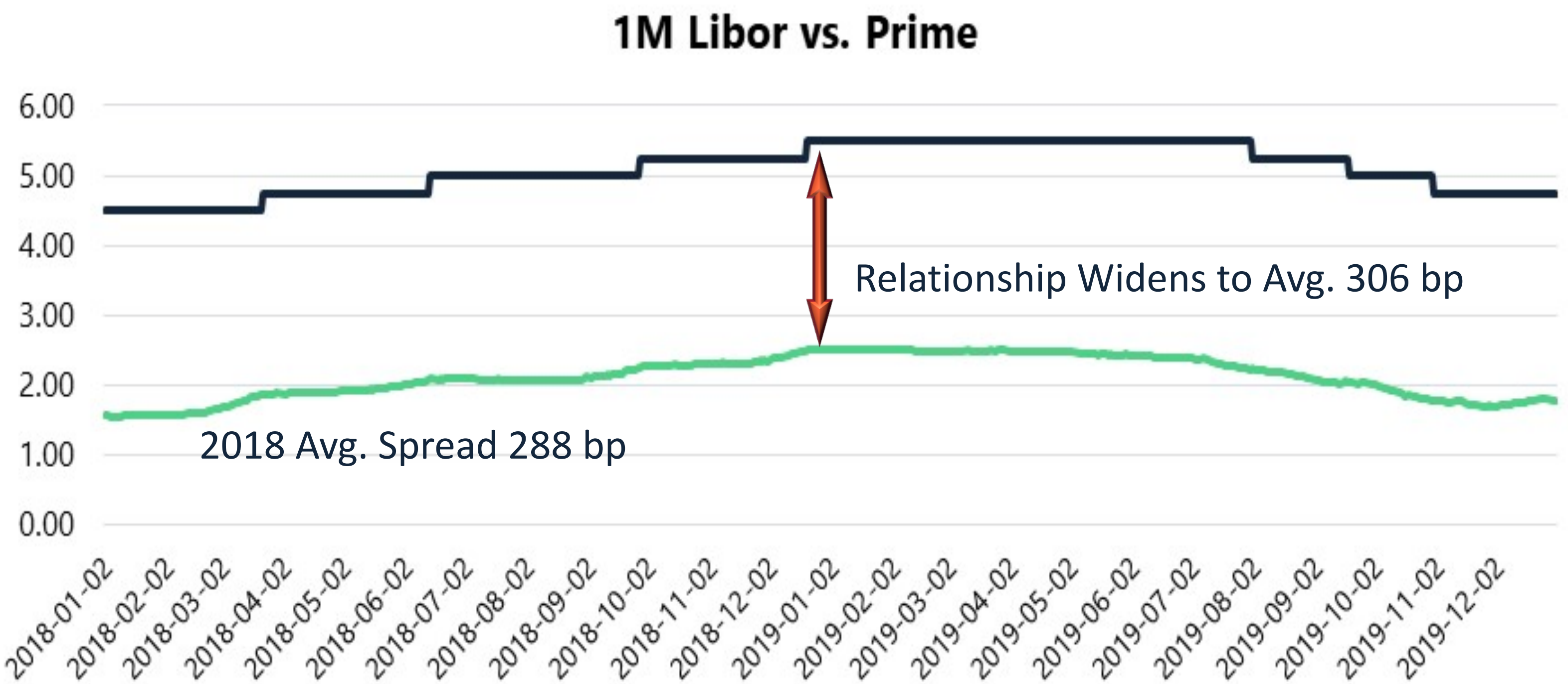
Basis Risk = Risk from disconnects between market rates or repricing indices

- Institution needs to quantify their exposure
- Hold everything else constant and move an index relationship

Example:

Variable rate loans ;
½ Reprice to 1 M LIBOR + Spread
½ Reprice to Prime + Spread

Quantify Impact



Summary

Conclusions

- Discussed what the key drivers are of inherent interest rate risk
  - Repricing – maturity – term of cash flows

- How to properly measure your NII IRR and EVE (NEV) through both static and dynamic approaches

- Understanding how your balance sheet structure dictates your risk profile

- The need to assess risk exposure to both points on the curve and indices

Balance Sheet Risk Management Solutions

Data Assessments

We audit a financial institution's available data and identify opportunities and solutions to improve model risk management and CECL readiness.

Model Validations

Independent third-party validation of a wide range of financial models used for balance sheet and business decisions including ALLL, ALM, Liquidity, Credit, and many more.

Credit & Interest Rate Risk

Deliver a range of risk analytics to help identify and quantify risks within your balance sheet, and under multiple economic and interest rate scenarios.

Model Risk Management

Assess model policies, processes, data and documentation. Provide guidance and consulting related to model governance and implementation.

CECL Credit Risk Services

We provide solutions for all stages of CECL implementation including model data remediation, development, validation, model implementation, model monitoring, ALLL assessments, and ongoing model monitoring.

Deposit Studies

We provide a top-down, quantitative analysis of non-maturity deposit behavior including estimates of historic data, core deposit supply, rates paid, average lives, present values, and more.

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Thank You

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Our Journey To Date

'95 McGuire is Formed

Dr. Bill McGuire and Dr. Richard Sheehan form McGuire Performance Solutions, an analytics firm providing loan and deposit behavior analysis and financial model validations

18+ Colleagues

'14 MountainView Acquires McGuire

MountainView Financial Solutions, a leader in the valuation and brokerage of MSRs, Whole Loan and other financial instruments, acquires McGuire Performance Solutions.

80+ Colleagues

'14 Further Investment in Analytics Services

Company expands solutions and team to capture stress testing risk analytics including econometric credit models for DFAST/CCAR.

95+ Colleagues

'18 Situs Acquisition

MountainView Financial Solutions is acquired by Situs.

800+ Colleagues

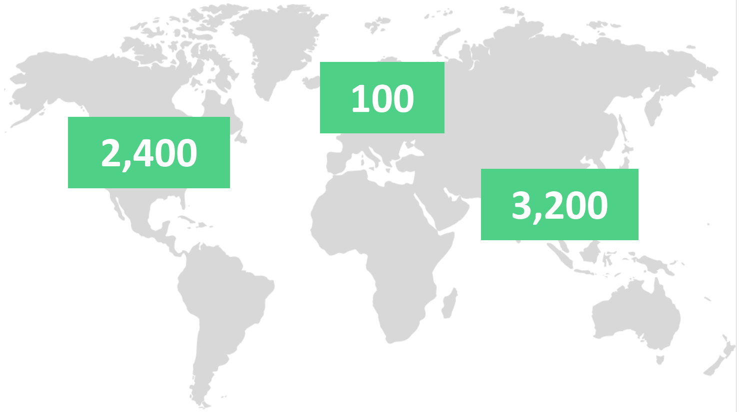
'19 SitusAMC is Formed & MVRA Rebrands

Situs merges with American Mortgage Consultants, Inc. to form SitusAMC, the leading technology and services provider to the real estate and corporate finance industry. MountainView's model risk management and loan and deposit offering is rebranded as MountainView Risk & Analytics, a SitusAMC Company.

5,700+ Colleagues

SitusAMC is the leading independent provider of technology, data & analytics, strategic outsourcing, advisory, & talent solutions to the real estate & corporate finance industries

SitusAMC is a global firm that was formed in June 2019 by the merger of Situs Group Holdings Corp., American Mortgage Consultants, Inc., & associated firms



Our Offering

MountainView Risk & Analytics, a SitusAMC Company, is the leading provider of model risk management solutions and loan and deposit behavior analytics to financial institutions.

Formerly McGuire Performance Solutions, MountainView's team of experts leverage our Patented Advanced Assessment Methodologies and licenses to most major ALM models to empower our partners to make informed and confident decisions leveraging our unrivaled depth of expertise, dedication, and market knowledge.

OUR SERVICES

Model Validation

- Asset Liability Management "ALM" / IRR / FTP Models
- Liquidity Stress Testing Models
- CECL / ALLL Models
- Credit Models
- BSA / AML / Fraud Models
- MSR / Mortgage Pipeline Models
- Capital Stress Testing Models
- Pricing Models

Model Risk Management

- Model Risk Management Program Development
- Model Risk Management Gap Analysis
- Model Risk Management Program Review
- Model Documentation Development or Completion
- Liquidity Risk Management Function Review
- Policy Enhancements or Reviews
- ALCO or Board Training

Deposit Analysis

- Comprehensive Deposit Analysis
- Repricing/Runoff Analysis
- Summary Data Analysis
- Core Deposit Index
- Segmentation Analysis
- Structured Vintage Analysis

Loan Prepayment

- ALM Model Inputs Analysis
- CECL Model Inputs Analysis
- Loan Prepayment Index

CDI & Other Valuations

- Core Deposit Intangible Valuation Analysis
- CD Valuation Analysis
- Entity Valuation

MountainView™
Risk & Analytics
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By The Numbers

180+
Yearly Average of
180+ Model Validations

170+
Yearly Average of
170+ Deposit Studies

25+ Years
Robust Database & Experience
With Over 25 Years of
Data Collection and Delivery

Disclaimers

General

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Past Performance

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