An Integrated Risk Management Model for Japanese Non-Life Insurers
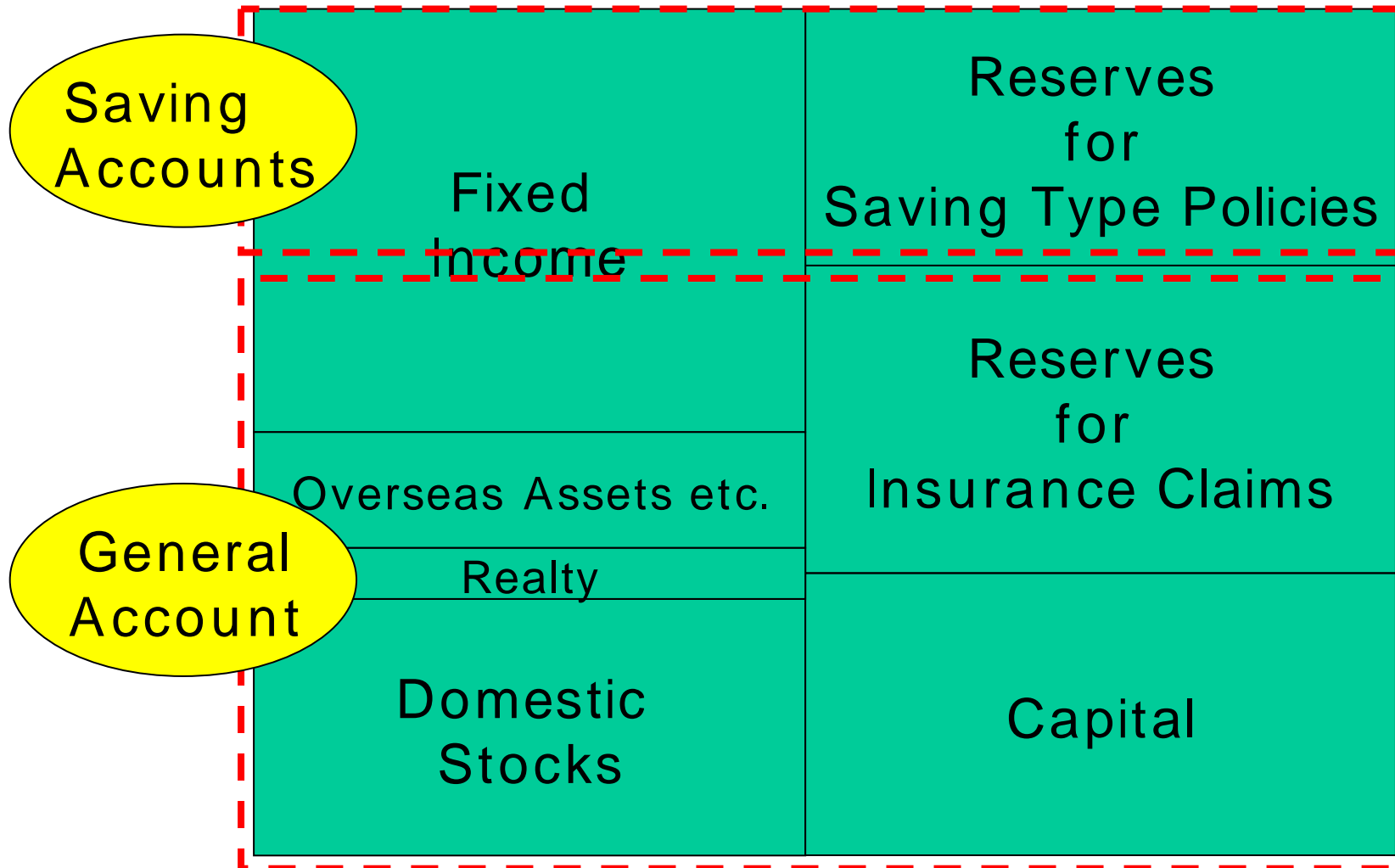
Sompo Japan Insurance Inc.
Mizuho DL Financial Technology
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2. Model Overview
3. Scenario Generator Design
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5. Conclusion

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1. Background

Balance Sheet

Saving Accounts

Fixed Income

Reserves for Saving Type Policies

General Account

Overseas Assets etc.

Realty

Domestic Stocks

Reserves for Insurance Claims

Capital

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Important Facts behind the Risks

- Asset Investment Risks
  - Cross-holdings
  - Real Estate Investment
  - Overseas Investment
  - Corporate Bonds & Loans
  - Credit Risk
- Interest Rate Mismatch Risks
  - Saving Type Policies
  - Life Insurance Business
- Catastrophe Risks
  - Earthquake
  - Storm and Flood

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Model Coverage

- Market Risk
  - Stock Prices (systematic risk & unsystematic risk)
  - Interest Rates (HJM Model)
  - Foreign Exchange Rates
- Credit Risk
  - Default
  - Credit Rating Transition
  - Credit Spread Widening
- Realty Investment Risk
- Interest Rate Mismatch Risk (i.e. Negative Interest Rate Margin)

Purpose of Integration

- Recognition and Understanding of Risk
- Measurement of Risk (Reflecting Diversification Effect)
- Risk Capital Control (Capital Adequacy)
- Internal Communication
- Information for Decision Making
  - Risk Adjusted Return
  - Shareholders' Value Added etc.

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How we define "integrated model"

- An integrated model should:

  (1) cover all major risk factors.

  (2) cover all major B/S items.

  (3) measure risks by a common unit.

  (4) reflect diversification effects among

     different types of risk.

- "The NEW MODEL" is a communication tool.

2. Model Overview

Definition of Risk

- ## Mark-to-Market Concept
  - Applicable to Asset Allocation
  - Applicable to Surplus ALM

- ## XVaR
  - Downward Potential of the Market Value of our Capital
  - VaR is Defined as the difference between

    (a) expected value   and

    (b) x percentile point

Model Implementation

- Monte Carlo simulation applied to all major BS items

- A scenario generator deals with major risk factors, including equity, interest rate, forex, credit risk.

- The scenario generator provides 50,000 probabilistic scenarios.

- Assets and Liabilities are valued under each scenario.

- Distributions of possible market values in one year are generated.
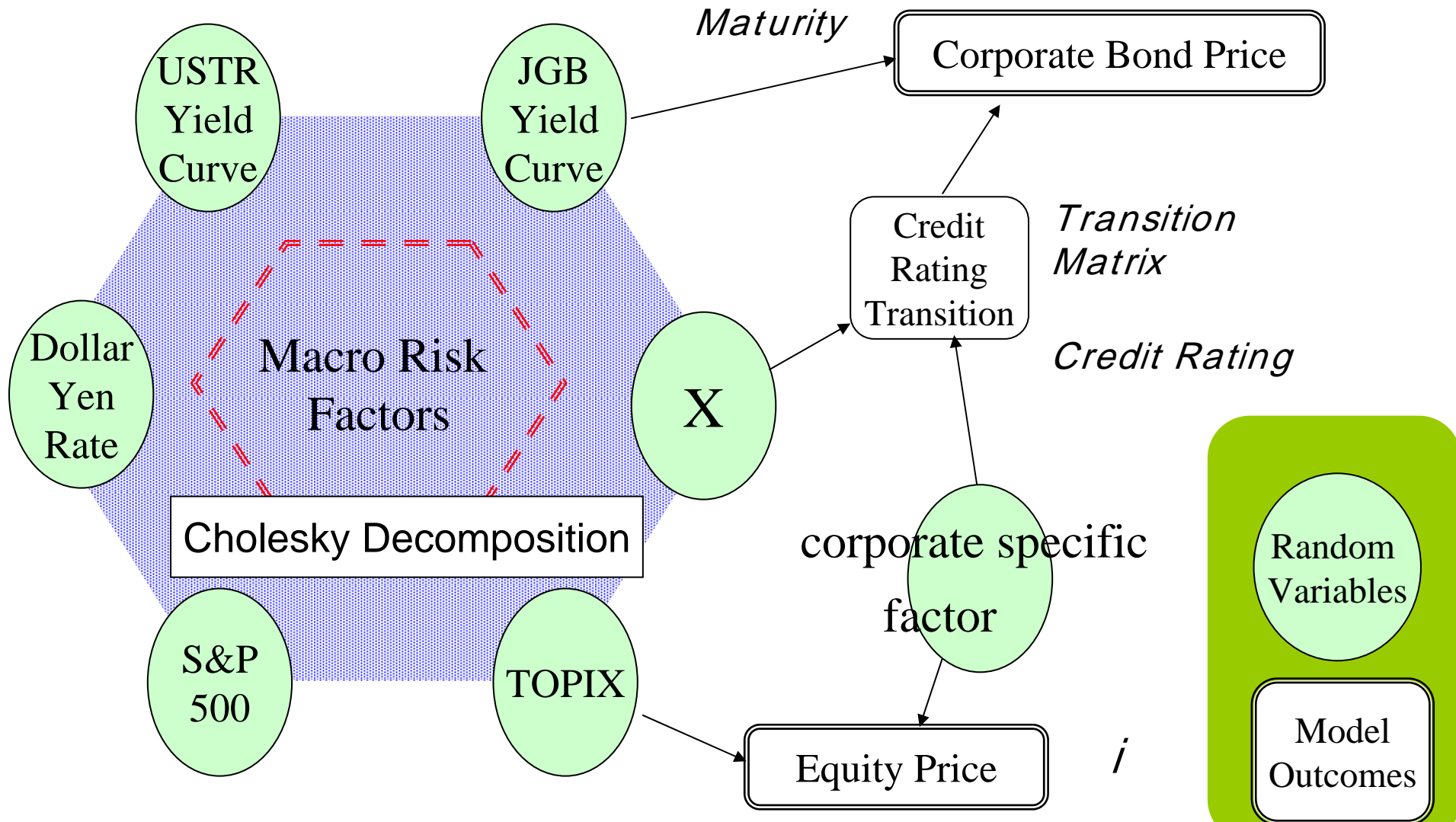
B/S Items and Explanatory Factors

		(Macro) Risk Factors				
		Market			Credit	Other
		Interest	Equity	Forex		
Assets	Cash & Short Term Investment					
	Domestic Bond					
	Domestic Equity					
	Foreign Bond					
	Foreign Equity					
	Alternative Investment Vehicles					
	Corporate Loan					
	Realty Investment					

3. Scenario Generator Design

A Method to Link Market Risk and Credit Risk

Relationship among Risk Factors

USTR Yield Curve

JGB Yield Curve

Maturity

Corporate Bond Price

Dollar Yen Rate

Macro Risk Factors

X

Credit Rating Transition

Transition Matrix

Credit Rating

Cholesky Decomposition

corporate specific factor

S&P 500

TOPIX

Equity Price

i

Random Variables

Model Outcomes

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Credit Risk Factor X and TOPIX

- A correlation between X and TOPIX can be observed.

Year to Year TOPIX Return and

One Year Change in X (normalised)
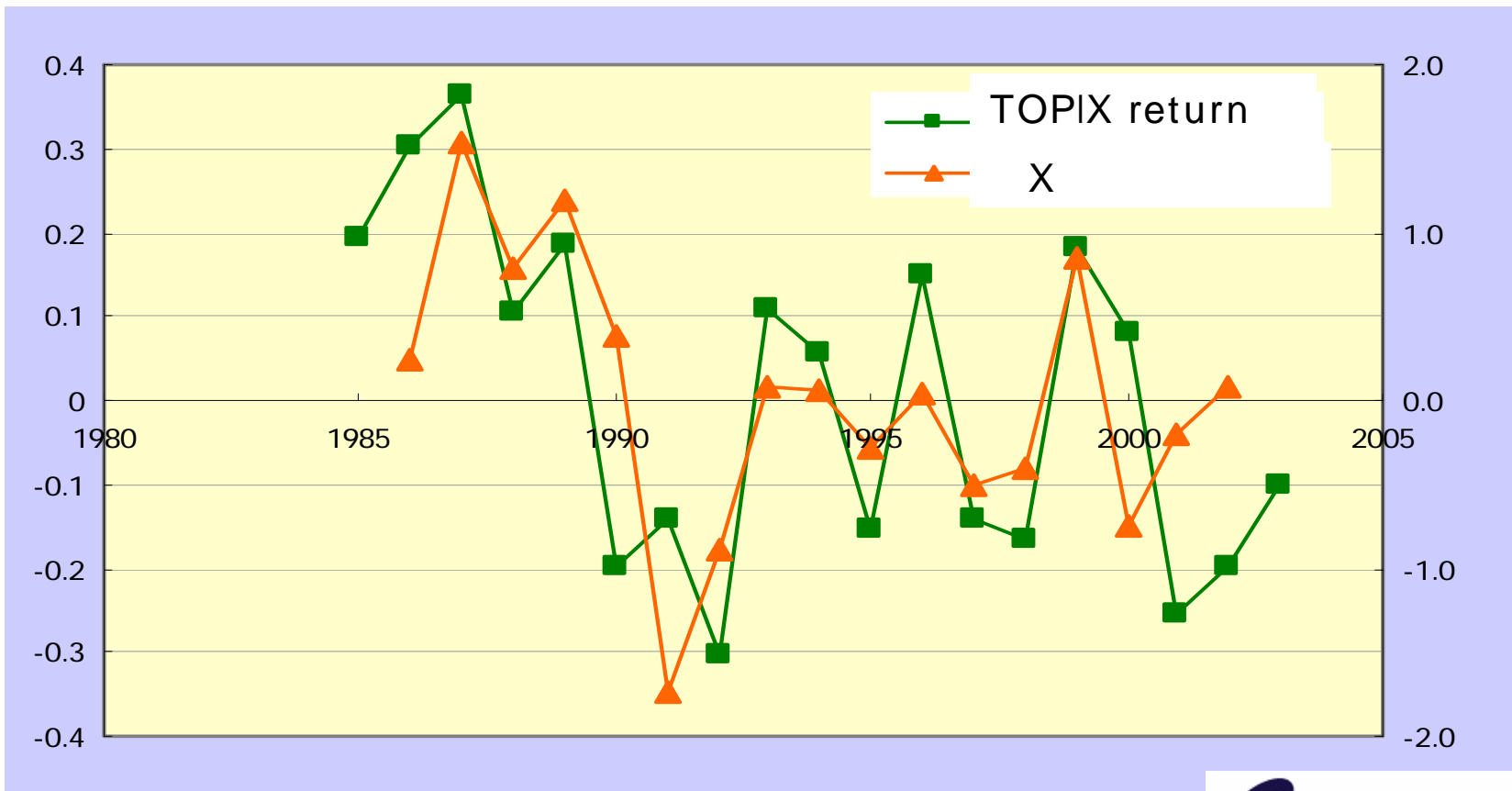
4. Model Results and Insights

How do we utilize the model ?
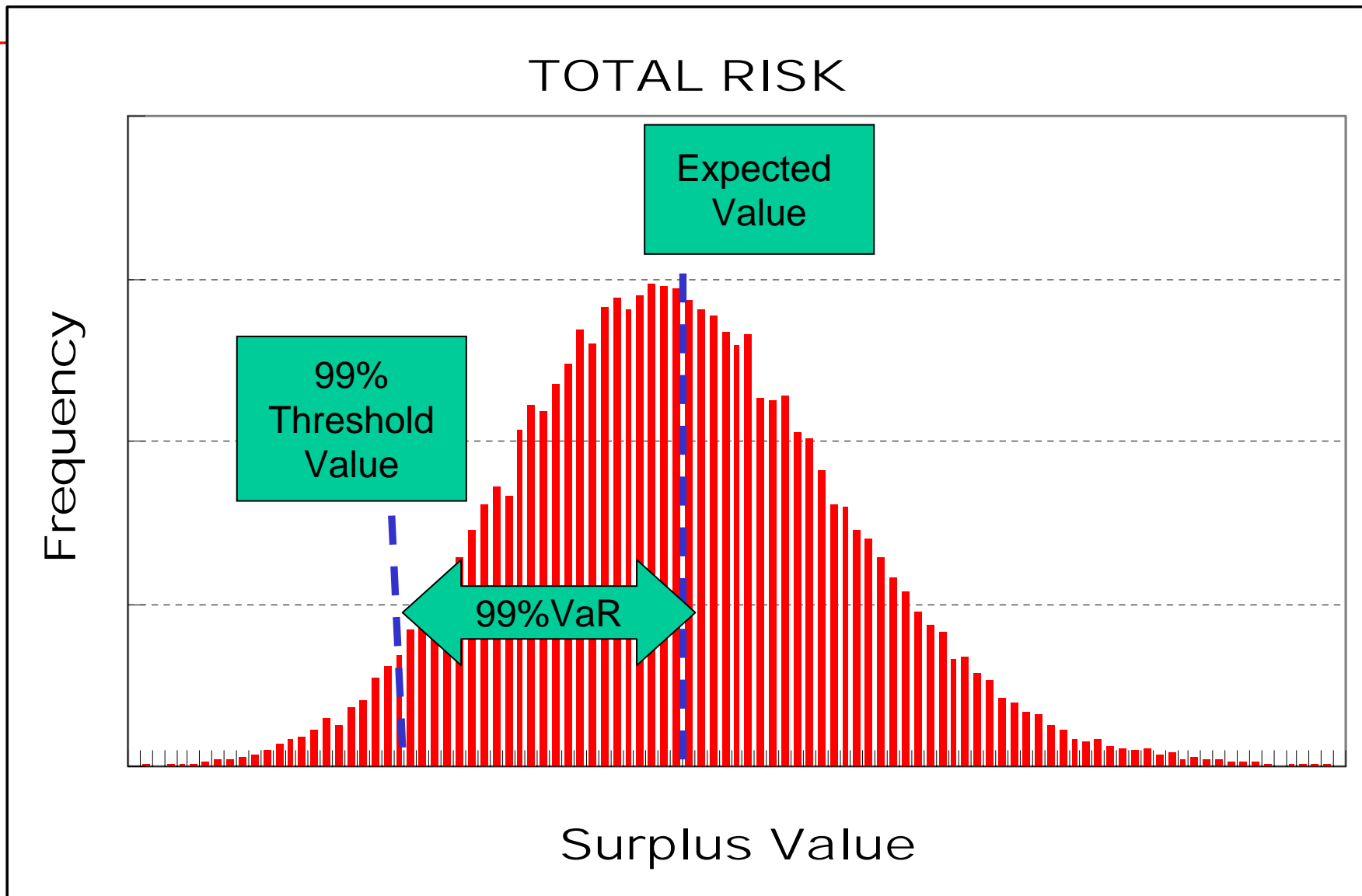
Model Applications

- Current Function
  - Risk Monitoring
  - Risk Measurement
  - Risk Attribution
  - ALM
  - Assessment of Asset Allocation Plans

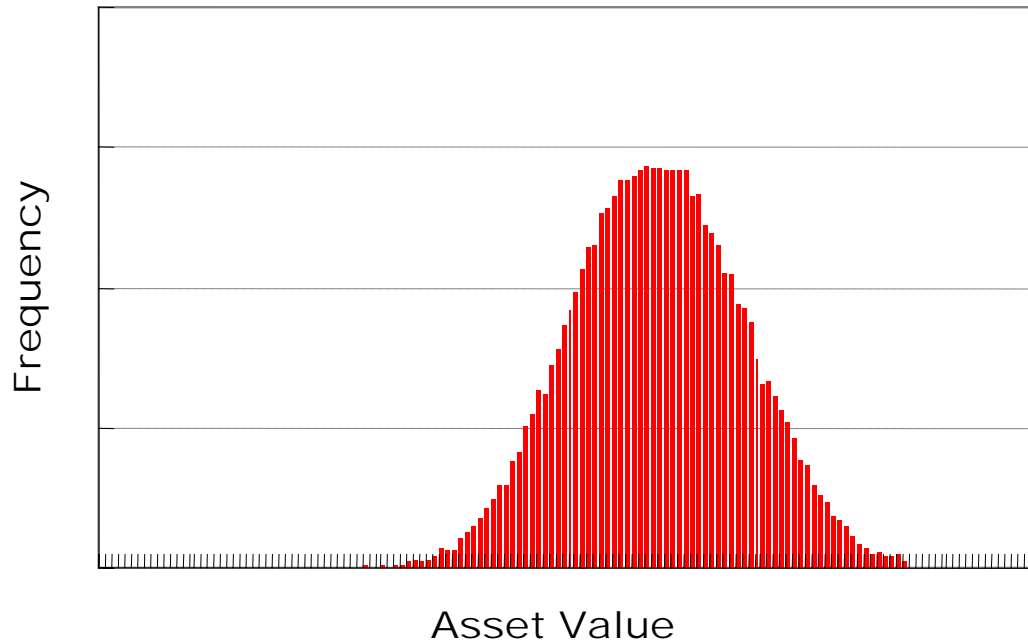# Risk Mapping

Risk Mapping Simplified Form)

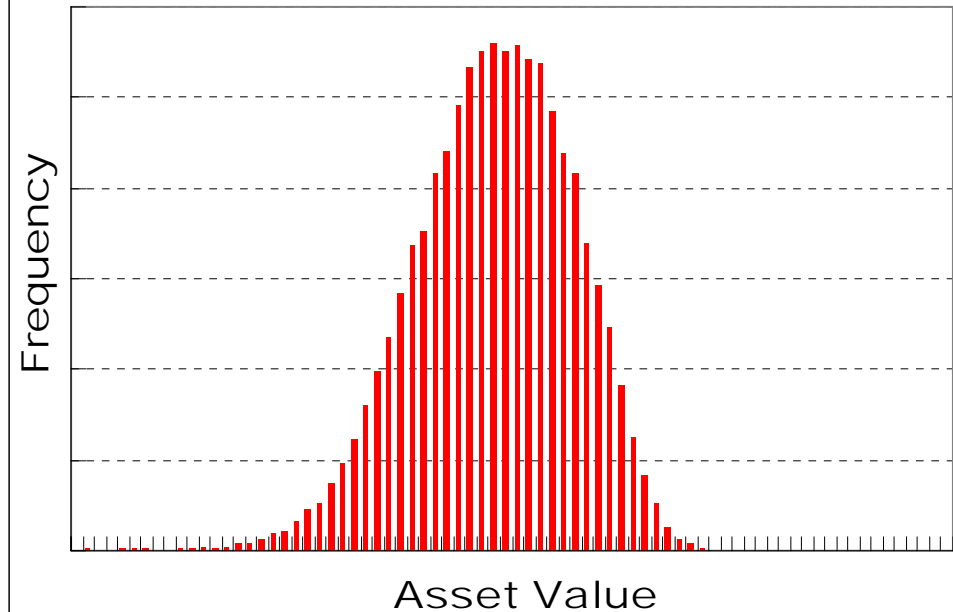| Assets& Liabilities	Market Value	RISK FACTOR								
		DOMESTIC INTEREST RATE	FOREIGN INTEREST RATE	DOMESTIC STOCK MARKET	FOREIGN STOCK MARKET	FOREIGN EXCHANGE	CREDIT RISK	REAL ESTATE MARKET	DIVERSI-FICATION EFFECT	TOTAL
Cash	XXXXX						XXXXX		XXXXX	XXXXX
Domestic Bond	XXXXX	XXXXX					XXXXX		XXXXX	XXXXX
Corporate Loan	XXXXX	XXXXX					XXXXX		XXXXX	XXXXX
Personal Loan	XXXXX	XXXXX					XXXXX		XXXXX	XXXXX
Domestic Equity	XXXXX			XXXXX			XXXXX		XXXXX	XXXXX
Foreign Bond	XXXXX		XXXXX			XXXXX			XXXXX	XXXXX
Foreign Equity	XXXXX				XXXXX	XXXXX			XXXXX	XXXXX
Alternative Investment	XXXXX					XXXXX			XXXXX	XXXXX
Real Estate	XXXXX							XXXXX		XXXXX
Credit Insurance							XXXXX			XXXXX
Foreign Currency Hedging						XXXXX				
Asset TOTAL (Gross)		XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
Diversification Effect		XXXXX				XXXXX	XXXXX		XXXXX	
Asset TOTAL (Net)	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
Liabilities	XXXXX	XXXXX								XXXXX
Surplus	XXXXX	XXXXX								XXXXX

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Risk Measurement (Total Risk)

Risk Measurement (Asset by Asset)

HIGH QUALITY BOND

Frequency

Asset Value

Loan

Frequency
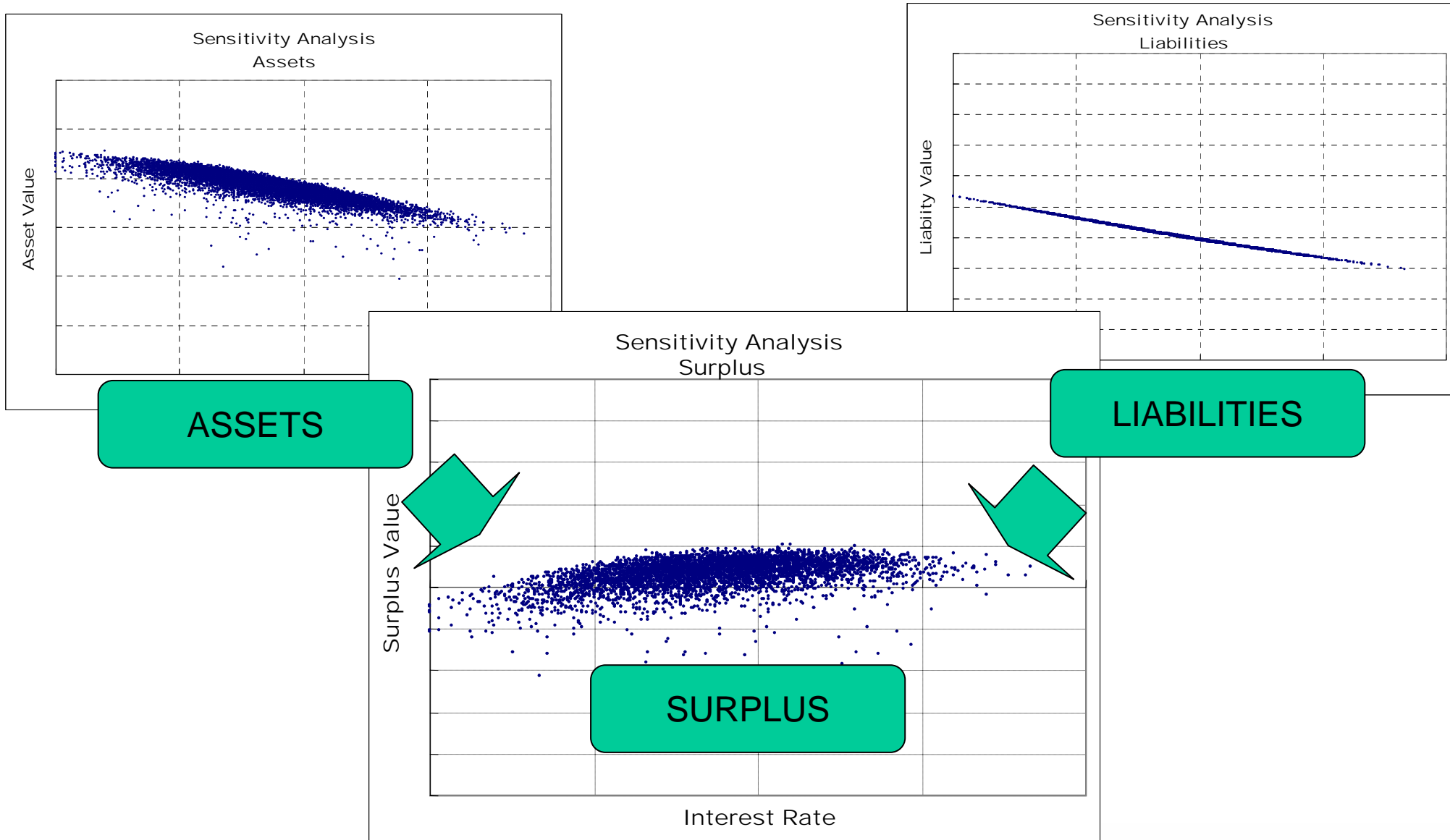
Asset Value

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Risk Measurement (Hedge Effect)

Hedge Effect

Frequency

No hedge

Option
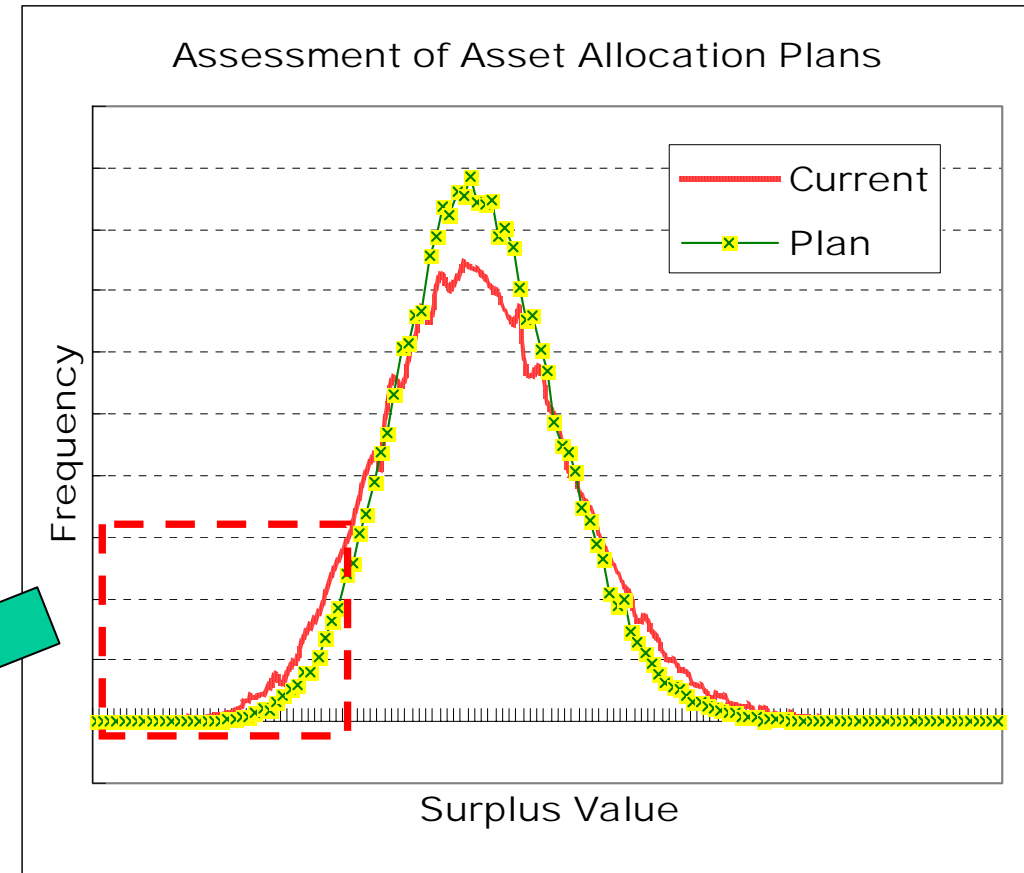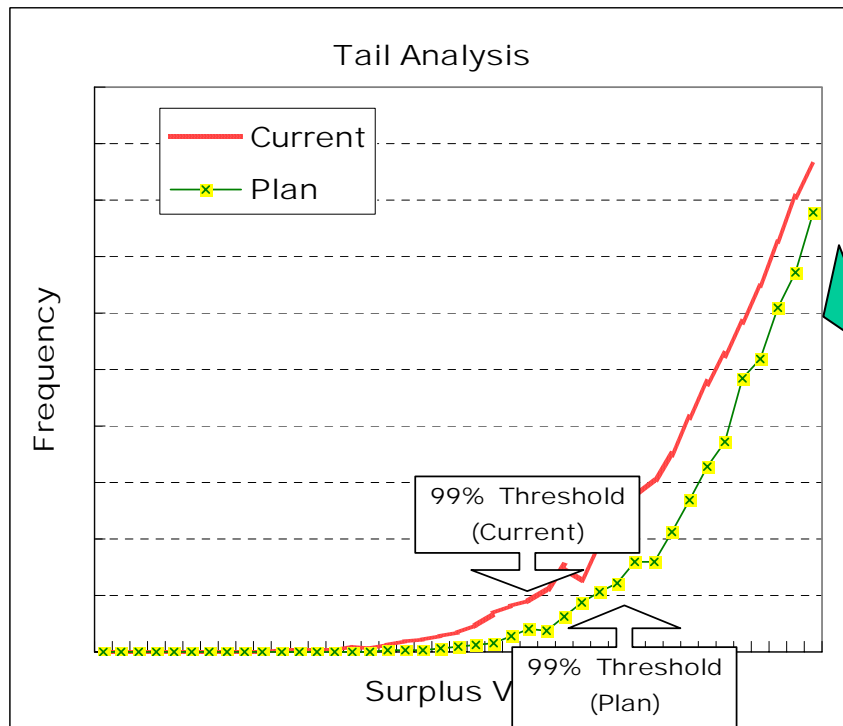
Asset Value

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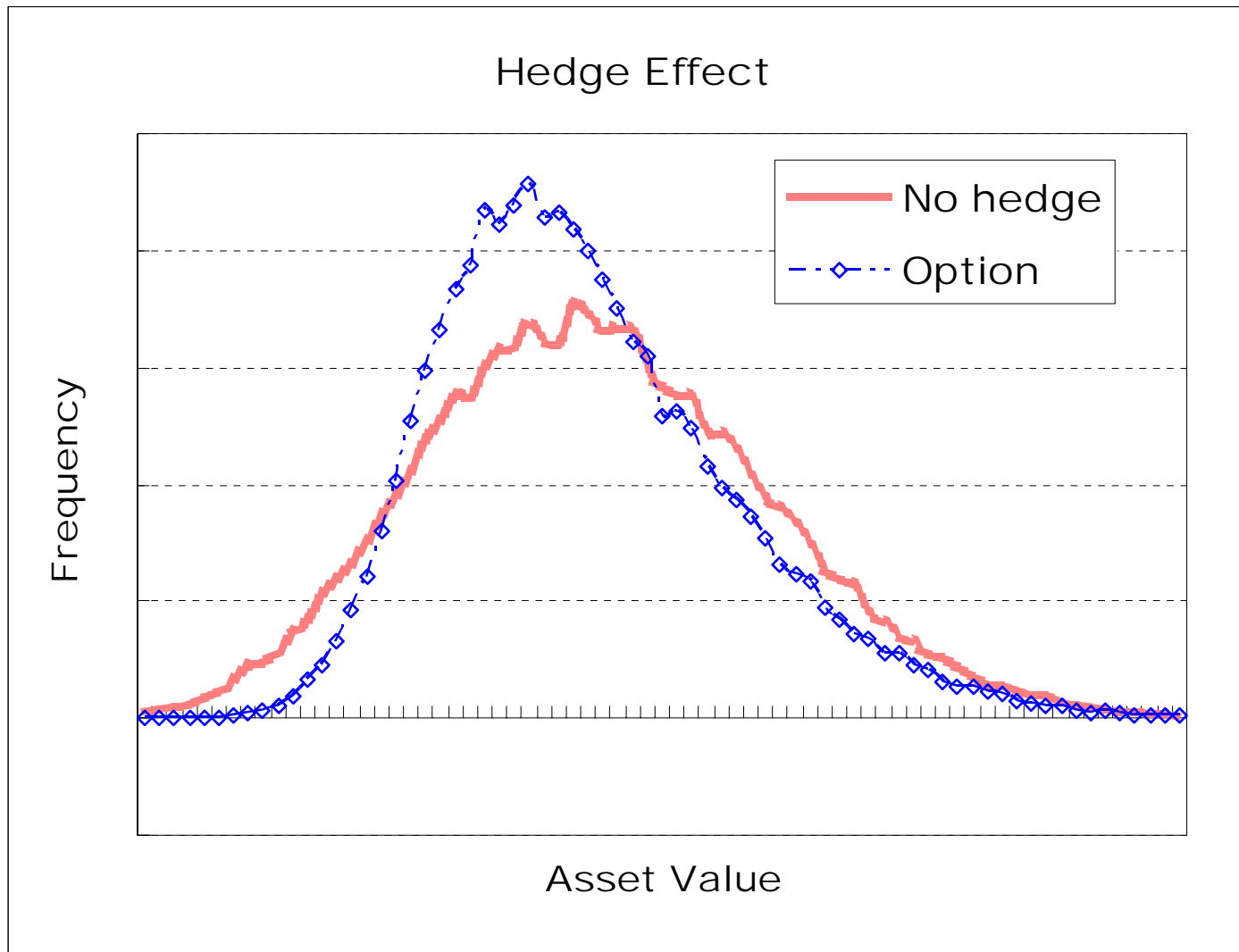
Risk Attribution
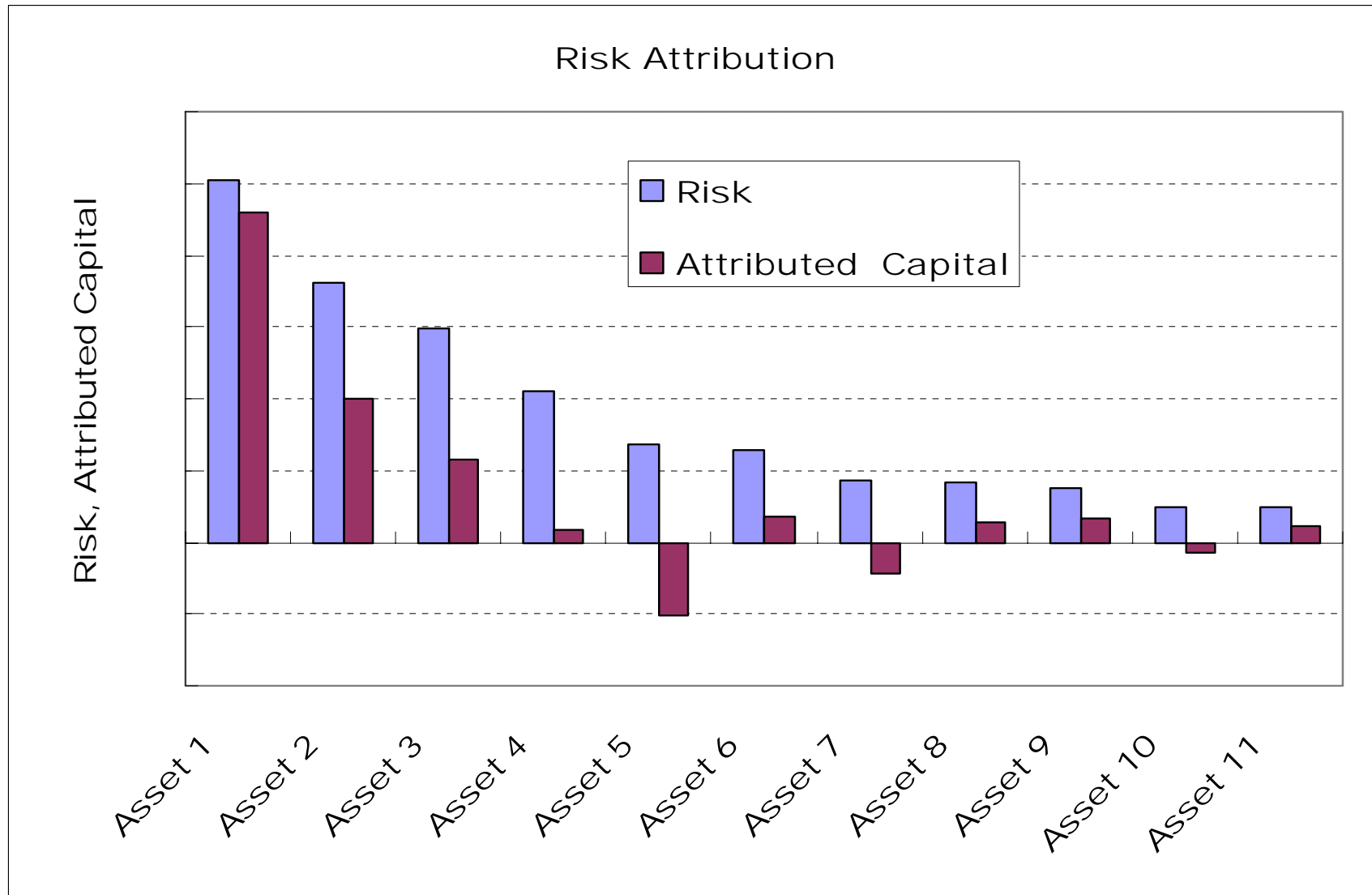
Asset Liability Management

Asset Allocation Alternatives and Risk

5. Conclusion

Summary

- Financial risks are integrated by the model.
- The model results are to be used for
  - risk measurement to check capital adequacy.
  - asset liability management.
  - risk attribution.
  - risk monitoring.
  - assessment of asset allocation alternatives.
- The following risks are not integrated.
  - Insurance Risk
  - Operational Risk