

Scenario Generation Framework for SAA

Agenda

1. Introduction to Scenario Generator
2. Scenario Based SAA
3. SAA: Applying In-house Views
4. Summary
5. Questions

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Introduction to Scenario
Generator

Economic Scenario Generation – Stochastic Modelling

“SG”

Economic
Scenario
Generation

“ESG”

Environmental,
Social, and
Governance

What is Economic Scenario Generator

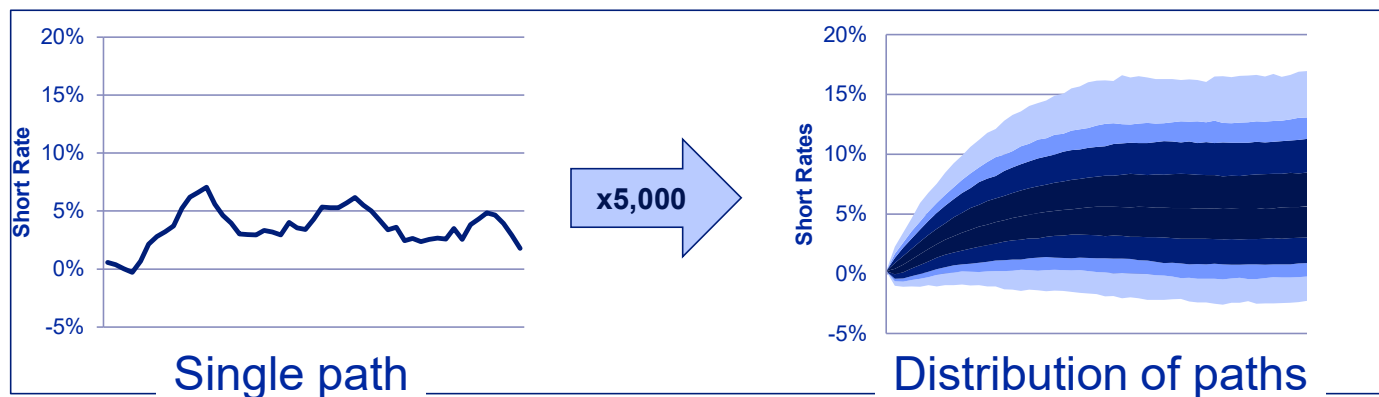
Generates scenarios for various economic variables and asset returns using Monte Carlo simulation

- Generate 1000s of different paths of an economy by stochastically modelling many different risk drivers
- Interest rates, equity returns, corporate bond returns

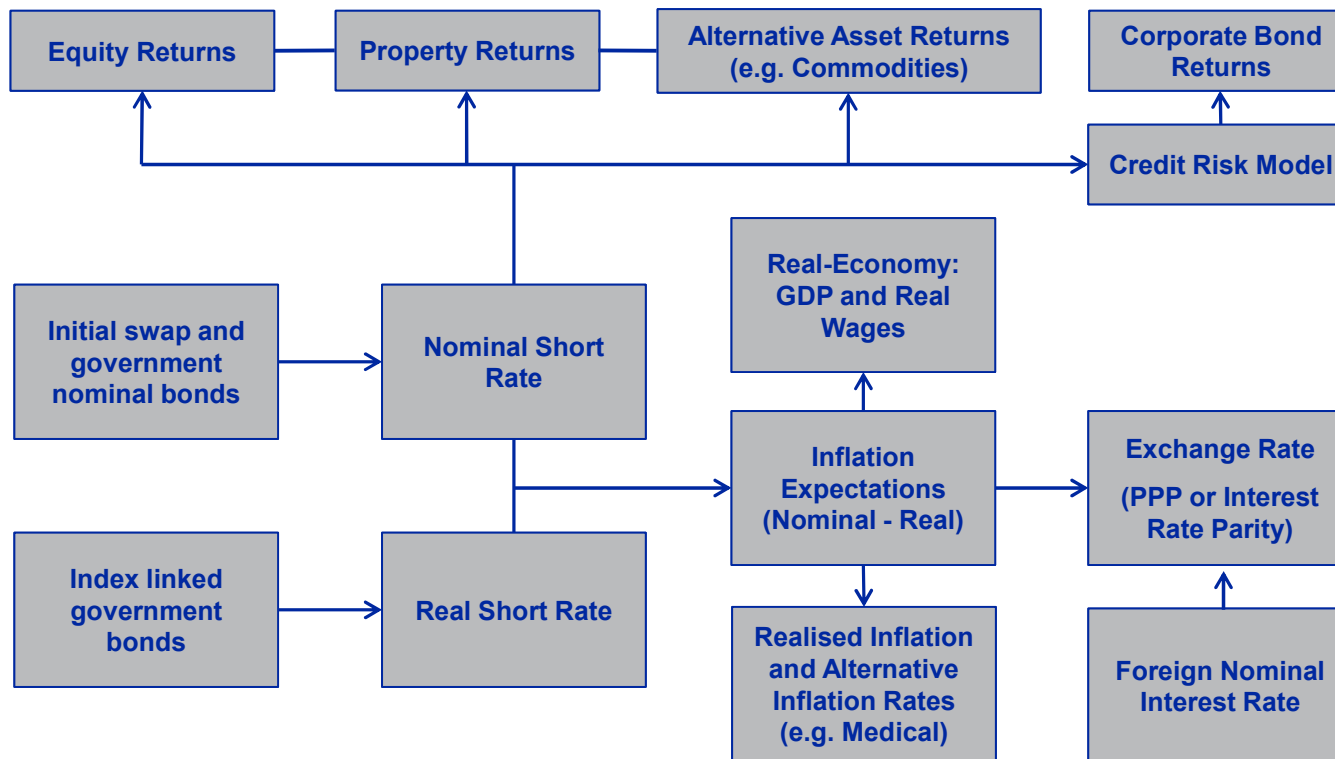
Two main uses:

- Real-world projections for risk management and SAA
- Market-consistent valuation for pricing

A simulation is a collection of many paths (trials)



ESG Economy Model Structure



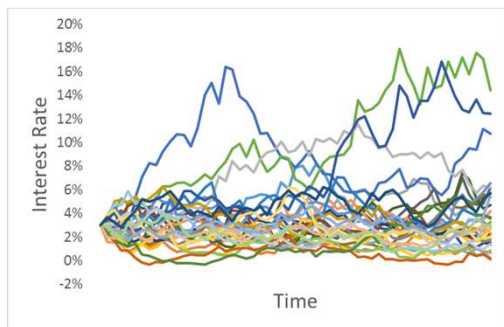
- » Equations describe stochastic evolution of key financial assets
- » Correlations ensure plausible economic relationship between asset classes

Scenario-Based Framework

Risk measurement and portfolio construction

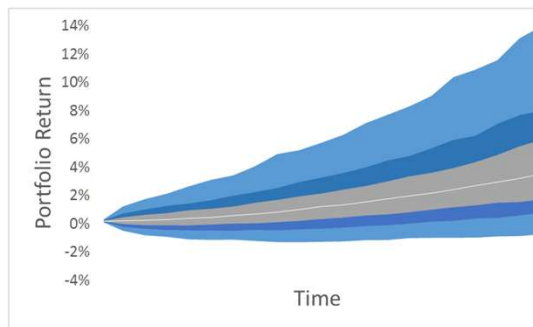
We use stochastic models to generate paths for **economic risk** factors, e.g.

- Real and nominal interest rates
- Credit spreads
- Equity volatility
- Exchange rates



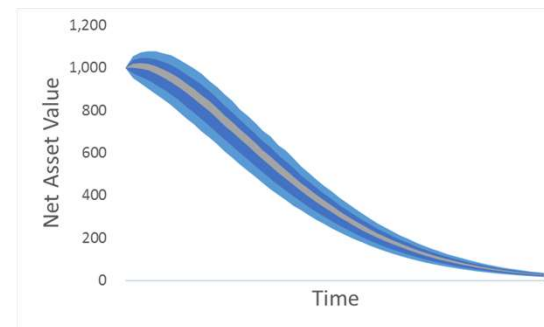
We use these risk factor projections to produce **asset returns**, e.g.:

- Corporate Bond returns
- Equities
- Foreign assets
- Alternative and real estate assets

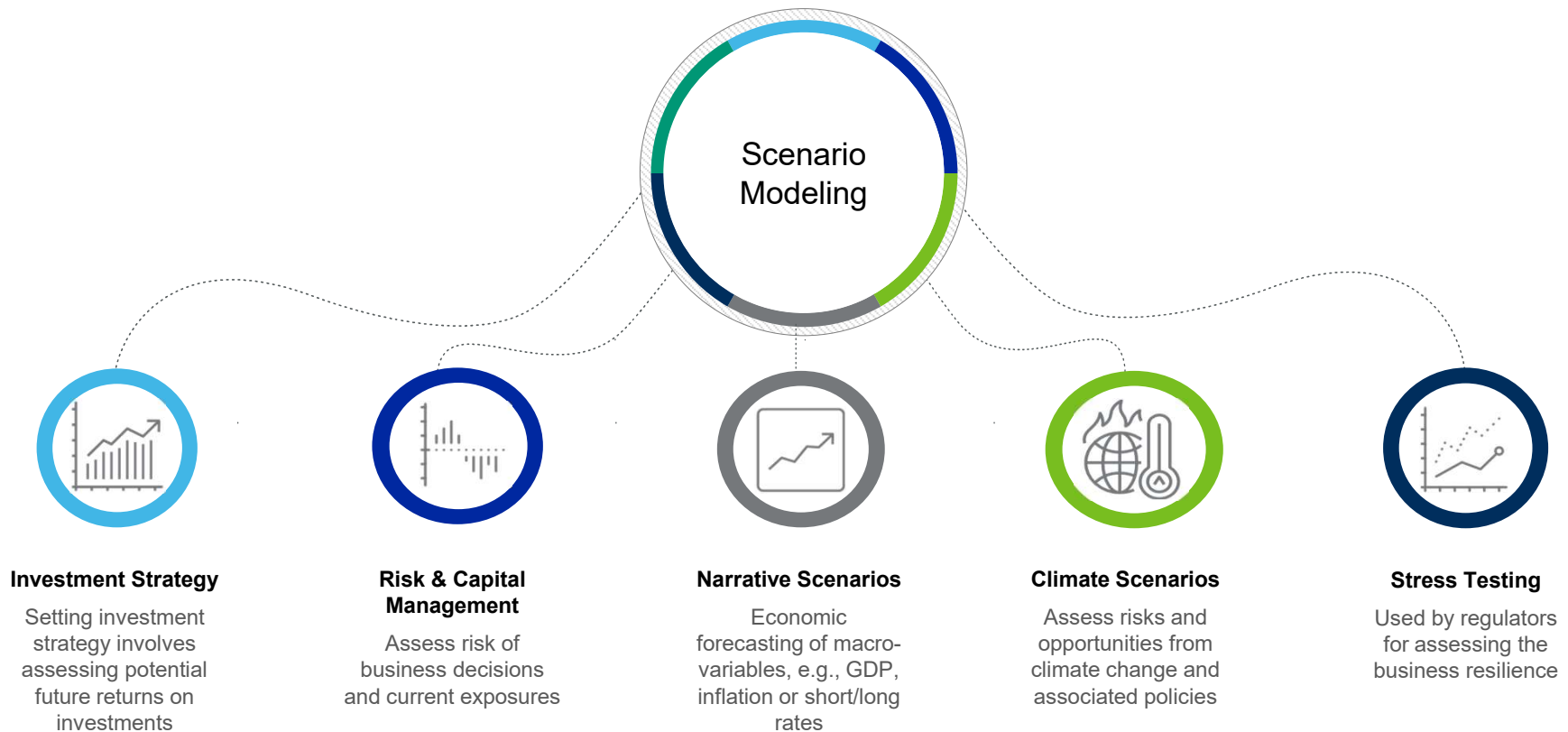


We combine these asset returns with **portfolio information**, rebalancing rules and potentially **liability information**.

This is used to project and analyze candidate strategies.



Scenario Generator Applications



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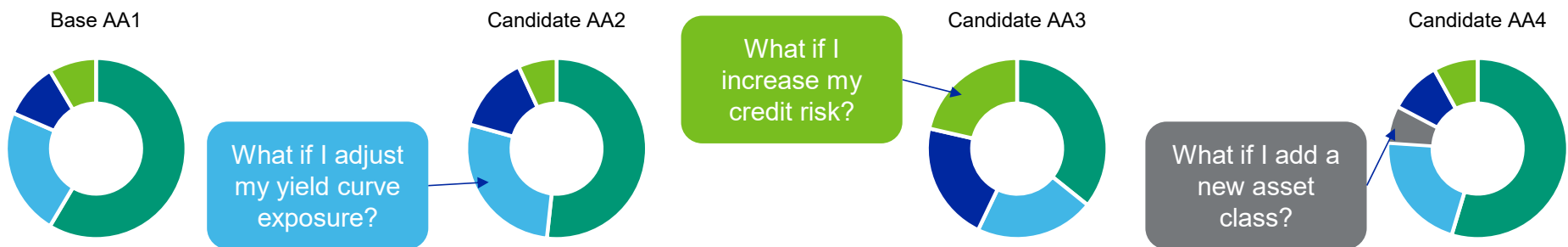
Scenario Based SAA

SAA Introduction

Investment Solution Design

How do I identify an optimal investment strategy for my insurance business?

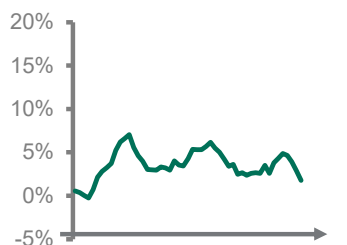
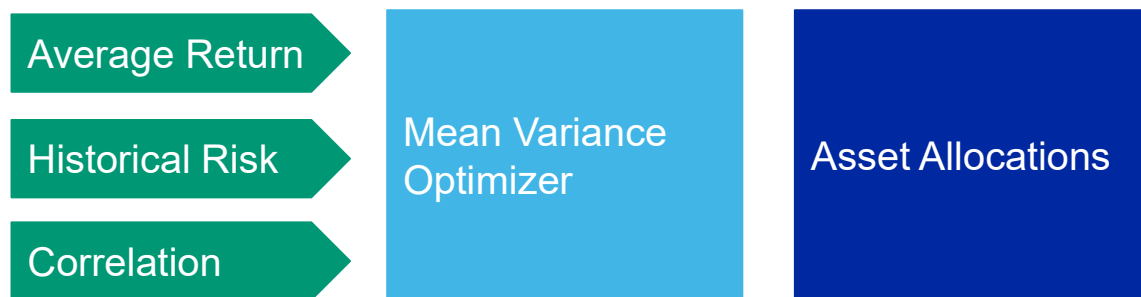
- » Analyse candidate asset allocations to answer “what if” questions, such as:



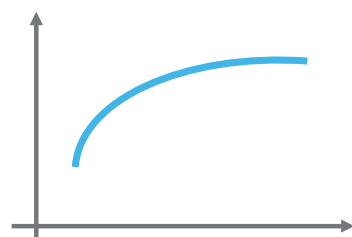
- » Analyse the impact of different rebalancing rules and trading strategies on my portfolio outcomes.
- » Compare outcomes for each strategy using risk metrics that are relevant to my business.

Traditional asset allocation approach

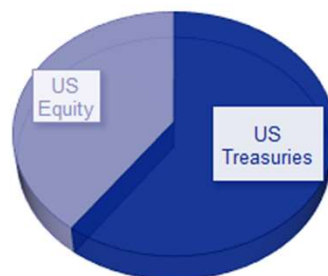
Mean-variance optimization (MVO)



Historical Returns



Efficient Frontier

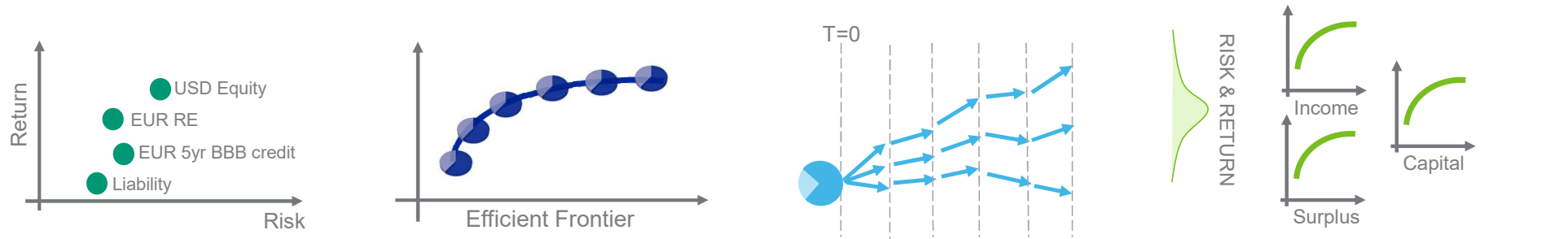


The traditional approach to asset allocation is MVO.

While simple, is it very limited in the richness of analysis:

- × Single time-step
- × Simple asset return assumptions
- × Simple, single objective risk measure
- × Does not allow for complex liabilities

Scenario Based SAA Process



- Select assets, risk factors
- Review base assumptions
- Impose in-house cap market views
- Produce model & assumptions governance reports
- Create scenario data required for analysis (stochastic, narrative)

- Review risk & return in existing portfolios
- Asset or Net Asset (ALM) view
- Track against business objectives: economic, accounting, capital
- Generate alternative ideas
- Optimize asset-only or asset-liability investment strategy

- Multi-period projection of asset & liability values & cashflows
- Capture range of candidate investment strategies, include new / alternative asset classes
- Reflect investment horizon, cashflows, re-investment & rebalancing rules, constraints

- Compare risk & return across wide range of metrics
- Assess portfolio strategies against business planning objectives
- Apply filters
- Detailed analysis for select strategies
- Generate analysis & reports to communicate investment decisions

Scenario-Based Portfolio Construction

Advantages over Mean-Variance Optimisation

Multi Time-step

Time dependent cashflows in/out. Event- or objective-driven (dynamic) portfolio rebalancing.

Liability Aware

Can incorporate liability cash flows, proxies or benchmarks.

Risk Metrics

Stochastic models generate a range of outcomes and produce sophisticated risk metrics.



Realistic Asset Dynamics

Incorporating features such as fat-tails and increased tail dependency.

Consistency

Assets and liabilities treated consistently with joint behavior of core economic variables.

Forward-Looking

Incorporating market or house views on equity volatility, yield curves, etc.

3

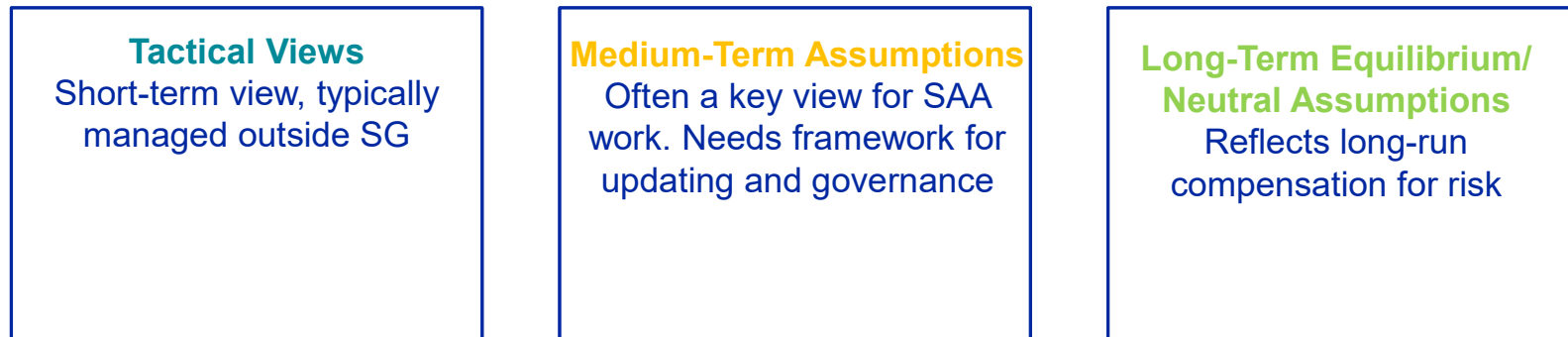
SAA: Applying In-House Views

Key Challenge: Applying in-house views

Any scenario generator is only as good as its calibration. Strategic asset allocation work can be particularly sensitive to assumptions and calibration approach.

If in-house capital market assumptions exist, how can these be applied within the modelling framework?.

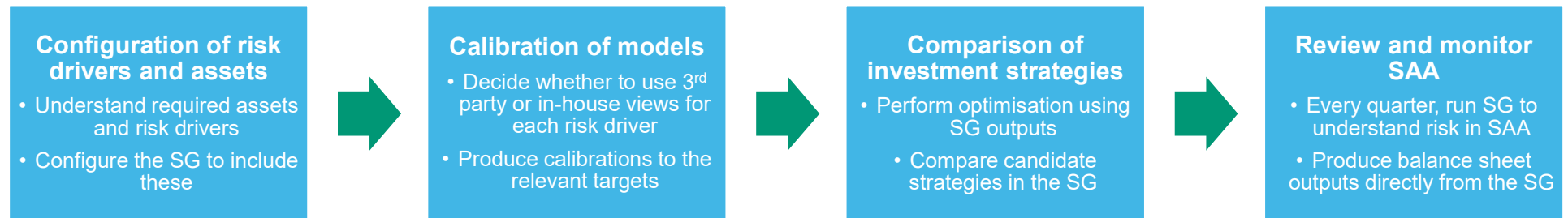
- » Can models be calibrated directly to assumptions?
- » Are there gaps in assumptions that need to be “filled in” with third party assumptions?



- Even if there is no house-view for a particular assumption, some governance of assumptions will be required.
- If this process is outsourced, it can be difficult to justify asset return assumptions and investment strategy.

In-House Investment Management Process

How does the investment team use the SG to reflect assumptions and perform investment analysis?



Benefits: SG for internal investment analysis

Internal Investment management want to understand and take ownership of risk in their investment strategy

- SG can be used to create real world scenarios that give 'realistic' distributions for asset returns and risk factors. These scenarios can be fed into investment analysis.
- By calibrating models to internal assumptions, investment managers can understand the impact of moving from base assumptions to internal views, gaining increased control and understanding of the assumption setting process.
- Investment managers can use resulting scenarios to project the distribution of returns for a range of investment strategies. This supports calculation of more relevant risk and return measures, and comparison of a range of investment strategies.
- Once a strategy is defined, can use the SG to monitor the risk as economic conditions change.

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Summary

Summary

- Move to **define investment objectives as a function of liabilities** rather than asset-only, leading to significant review of investment strategies and asset allocation process.
- Low yield environments leading to increased investment in **non-traditional, complex asset classes**, which require enhanced modelling capabilities.
- Traditional ALM systems generally too cumbersome for use by investment team in asset allocation process. Need for **dynamic, interactive “what if...” style analysis**.
- Many portfolio risk systems don't offer **coherent multi-time step modelling** of assets and liabilities, aligned with in-house economic and capital market view.
- Allows insurers to integrate SG output into investment and capital processes, achieving **greater consistency** across their business.

Q

Questions?

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