Asset Liability Management for Australian Life Insurers

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2. Potential for ALM in Australia

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1. Definition of ALM

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What is Asset Liability Management?

A definition (US SOA task force):

"**Asset - Liability Management** is the ongoing process of formulating, implementing, monitoring, and revising strategies related to assets and liabilities in an attempt to achieve **financial objectives** for a given set of **risk tolerances and constraints**."

- Coordination of decisions about assets and liabilities
- ALM is an ongoing process, not a one-time exercise
- The purpose of ALM is not necessarily to eliminate or even to minimise risk
  - The goal is to achieve financial objectives subject to risk tolerances and other constraints
ALM provides the ability to quantify the financial impact of changing economic conditions & different company strategies

This is the foundation of integrated risk and capital management

Economic scenarios (e.g. inflation, asset class returns, GDP)

Asset class behaviour

Liability behaviour

Asset/liability tactics and strategies

Financial results (ALM metrics)
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There are many opportunities to use ALM in Australia, requiring different degrees of model complexity.

**PRODUCT MANAGEMENT**

- Pricing for products with guarantees
- Reserving to specified confidence intervals
- Assessing policyholder bonus strategy for par business
- Measuring, analysing and controlling embedded options and guarantees

**COMPANY MANAGEMENT**

- Market consistent valuations
- Analysing the risk/return implications of investment strategies
- Determination and allocation of economic capital
- Setting performance targets
- Enterprise risk management

**Company Coverage**

- Selected products
- Whole Company

**Greater grouping of product features and data**

**Detailed product features and data**
Example 1: Calculation of target surplus and determination and allocation of economic capital

**Potential for ALM**

- Calculate the probability of breaching pre-defined thresholds given:
  - Your existing liabilities
  - Different investment strategies
  - Different new business strategies
- Calculate the economic capital required to limit the probability of ruin to an acceptable level
- Analyse strategies available to limit the amount of economic capital required
- Allocate this economic capital to different business units to assist in the comparison of return on capital across these business units

**Requirements**

- Complete model of assets and liabilities is required
  - Interactive asset and liability model
  - Dynamic policyholder behaviour
  - Dynamic company behaviour
- Model/data need to be tailored to facilitate reasonable run time
  - Any differences between models should be understood
- Management needs to define
  - Target thresholds
  - Acceptable probability levels
ANALYSING ECONOMIC CAPITAL AND THE PROBABILITY OF RUIN

ALM can be used to analyse the impact of different strategies, such as investment and product, on the economic capital requirement.

Two main objectives are possible:
- Investigating strategies that lower the probability of ruin for a given level of capital.
- Investigating strategies that lower the capital required for a given probability of ruin.
Example 2: Analysing the implications of investment strategies

Potential for ALM

- Establish formal guidelines around your investment strategy to ensure it is in line with your risk and return preferences
  - Guidelines based on robust analysis of interaction of assets and liabilities
  - Guidelines cover the current investment strategy, as well as how it should change under different economic conditions
- Gives more confidence regarding the suitability of your assets, given your liability profile
  - Different investment strategies can be objectively compared

Requirements

- Complete model of assets and liabilities is required
  - Interactive asset and liability model
  - Dynamic policyholder behaviour
  - Dynamic company behaviour
- Model/data need to be tailored to facilitate reasonable run times
  - Any differences between models should be understood
- Management need to determine the risk and return metrics used to compare different investment strategies
- Results should be incorporated into the investment guidelines
ALM Process for investment strategy analysis

Asset Investment Policy & Strategy to Analyse

Scenarios to Analyse

Stochastic Future Financial Projection

Calculating the financial results for each pair of one strategy/policy & one scenario

Analyse

Select Measure

Expected ROE (example of measure)

Risk Level

The financial results from each strategy/policy are compared

Selection of the investment strategy based on risk preferences
Comparison of investment strategies

Accumulated Profit after 5 years for a range of investment strategies

- Different investment strategies can be analysed in terms of your defined risk and reward preferences
- Analysis can incorporate dynamic company and policyholder behaviour
- Investment strategy and dynamic behaviour rules can change over time
### Potential for ALM

- Test the adequacy of current reserves to support the current bonus strategy under a range of scenarios
- The key levers that can be adjusted when analysing bonus strategy are:
  - Initial assets
  - Investment strategy
  - Bonus strategy
- Metrics used to compare different combinations of these levers are:
  - Probability of ruin
  - Cost of guarantees

### Requirements

- Requires a multiple liability product model, a comprehensive asset model and flexibility to adjust the key levers used in the analysis
- Requires the ability to project the business using stochastic investment scenarios
  - Real world scenarios
  - Risk neutral scenarios
- Management needs to define
  - Acceptable probability of ruin
  - Investment and bonus strategies
  - Risk and return metrics
Example 4: Pricing (and reserving) for products with guarantees

The ALM process would be used to:
- Calculate the charge required to cover the guarantee
- Calculate the reserving and capital requirements to specified confidence levels
- Perform profit testing

The model design combines a product model with stochastic asset returns:
- Corporate model sums across scenarios and controls company behaviour
- Liability model includes policyholder behaviour, such as dependent lapse rates and take-up rates
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Implementing an effective ALM system is an iterative process

- **Management Implementation**
  - Establish the necessary management infrastructure
    - Who will use the results and what will they expect?
    - Should the results be integrated into the regular reporting process?

- **Scope Definition**
  - Research how you can use ALM to manage your business more effectively

- **Software Implementation**
  - Build your ALM system
    - How can existing systems be incorporated in the ALM process?
    - Should you start simple and build the projection system in phases?
Trade-offs are required when developing an ALM system

- Tension exists between model detail and run speed
- ALM models must run quickly, yet be sufficiently detailed to provide meaningful conclusions
- The impact of different strategies is the key information provided by an ALM system

Model Detail vs. Run Speed

- Number of model points
- Number of scenarios
- Projection horizon and time step
- Modeling approach for dynamic interactions
- Product features modeled
- Precision of calculations
- Smart modelling techniques, eg customised code, scenario selection
Corporate ALM system

Corporate Model

Dynamic Products
- Base Liability Models
- Rider Liability Models

Approximate dynamic interaction with liability assumptions

Cashflows

Pre-generated Products
- Base Liability Model Output
- Rider Liability Model Output

Dynamic interaction with liability assumptions

Economic Scenario Generator

Asset Models
- Bond Model
- Loan Model
- Equity Model
- Cash Model
- Other Asset Model

Cashflows

Asset sale and purchase strategies

Approximate dynamic interaction with liability assumptions
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Discussion Topics

- One model or two?
- What is stopping greater analysis?
  - No risk?
  - Run times?
  - Insufficiently sophisticated asset models?
- ALM interactions
  - How can dynamic lapses be modelled?
  - Dynamic investment strategies?
  - Other interactions?
- How can ALM systems be tested?
- What are the characteristics of effective ALM systems?
- What is the current level of ALM use in Australia?
## Characteristics of effective ALM systems

<table>
<thead>
<tr>
<th>MODEL FEATURE</th>
<th>EXPLANATION</th>
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<tbody>
<tr>
<td><strong>Stochastic Modeling</strong></td>
<td>Ability to undertake stochastic modelling to calculate ALM metrics and investigate outcomes for different strategies.</td>
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<tr>
<td><strong>Dynamic Modeling</strong></td>
<td>Ability to undertake dynamic modelling to link asset and liability cashflows and incorporate company and policyholder behaviour.</td>
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<tr>
<td><strong>Pre-generated Cashflows</strong></td>
<td>Ability to use pre-generated liability cashflows for products that are not very interest sensitive.</td>
</tr>
<tr>
<td><strong>Flexibility and Ease of Use</strong></td>
<td>Flexibility to be able to perform all the necessary analysis and calculate all necessary metrics, and target the calculations to improve efficiency. Ease of use assists quick development and understanding of the model.</td>
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<tr>
<td><strong>Speed</strong></td>
<td>Ability to perform projections of thousands of economic scenarios. Distributed processing is an advantage for large numbers of scenarios.</td>
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<tr>
<td><strong>Flexible Reporting</strong></td>
<td>Ability to produce both deterministic and stochastic reports to meet all internal company requirements.</td>
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<tr>
<td><strong>Audit &amp; Control Tools</strong></td>
<td>Ability to monitor model changes to ensure consistency.</td>
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