



18TH EAST ASIAN
ACTUARIAL CONFERENCE

12-15 October 2014

Taipei International Convention Center in Taipei Taiwan

ALM as a Risk Management Tool

Aiza Yasmin Benyamin, FIA

Actuarial Partners Consulting, Malaysia



- Agenda

Setting the Scene

ALM Application

Making a meaningful analysis

SAA building blocks

Moving away from the Net Premium Valuation Method

- Prescribed basis for (minimum)
 - Valuation interest rate
 - Mortality basis
- Implicit allowance for expenses
- No provision for effect of surrenders and lapses

Moving away from the old Solvency Basis

- Assets valued at lower of book and market value.
- Solvency Margin Computation dependent on reserves, and premium, perhaps sum at risk.
- Ignores riskiness of asset composition, may have limits on asset allocations.

Risk Based Capital

- Concept of “Best estimate” liabilities
 - Reserving requirement to meet 75th percentile level of adequacy
 - Capital to target 1 in 20 risk of insolvency over one year
- Asset related risk charges on credit and market related risk
- Risk charge on mismatching

ALM is the “Bridge” between the two sides of the Insurers Balance Sheet

- Substantial Difference
 - Old basis had many implicit margins
 - With RBC, quantifies where the risk lies
- Regulators and best practice demands any business decisions made should revolve around managing these risk

Regulatory Risk Charges is on the way to Reflect Economic Cost

- Framework is continuously being improved to reflect risk within assets and liabilities
 - In M'sia there is not yet an allowance for diversification benefits for life insurance
 - In other countries, illiquidity premium risk may not have been considered
 - The charges itself can be challenged
- Current regulatory charges may not reflect true economic cost but as regulatory charges ties down shareholder's capital, which otherwise can be used for other ventures, this tied capital need to be rewarded appropriately

RBC is a Great Improvement but is still a Snapshot

- RBC determines the Capital Adequacy Ratio (CAR) at a particular date of measurement
- It does not say much in terms of *future* direction of solvency or CAR
 - Does not capture impact of future new business
 - Does not capture future movements in value of assets
- Demands a tool that considers the dynamic interplay between assets and liabilities

Two ALM Approach

- Risk averse
 - Take actions to minimize risk on your balance sheet
 - For life insurers, sell investment linked products
 - For general insurers, sell only short tail, low volatility business and put all assets in cash & short term bonds
- Risk represent an opportunity to profit
 - Hence ensure capital is adequately compensated

Managing Risk

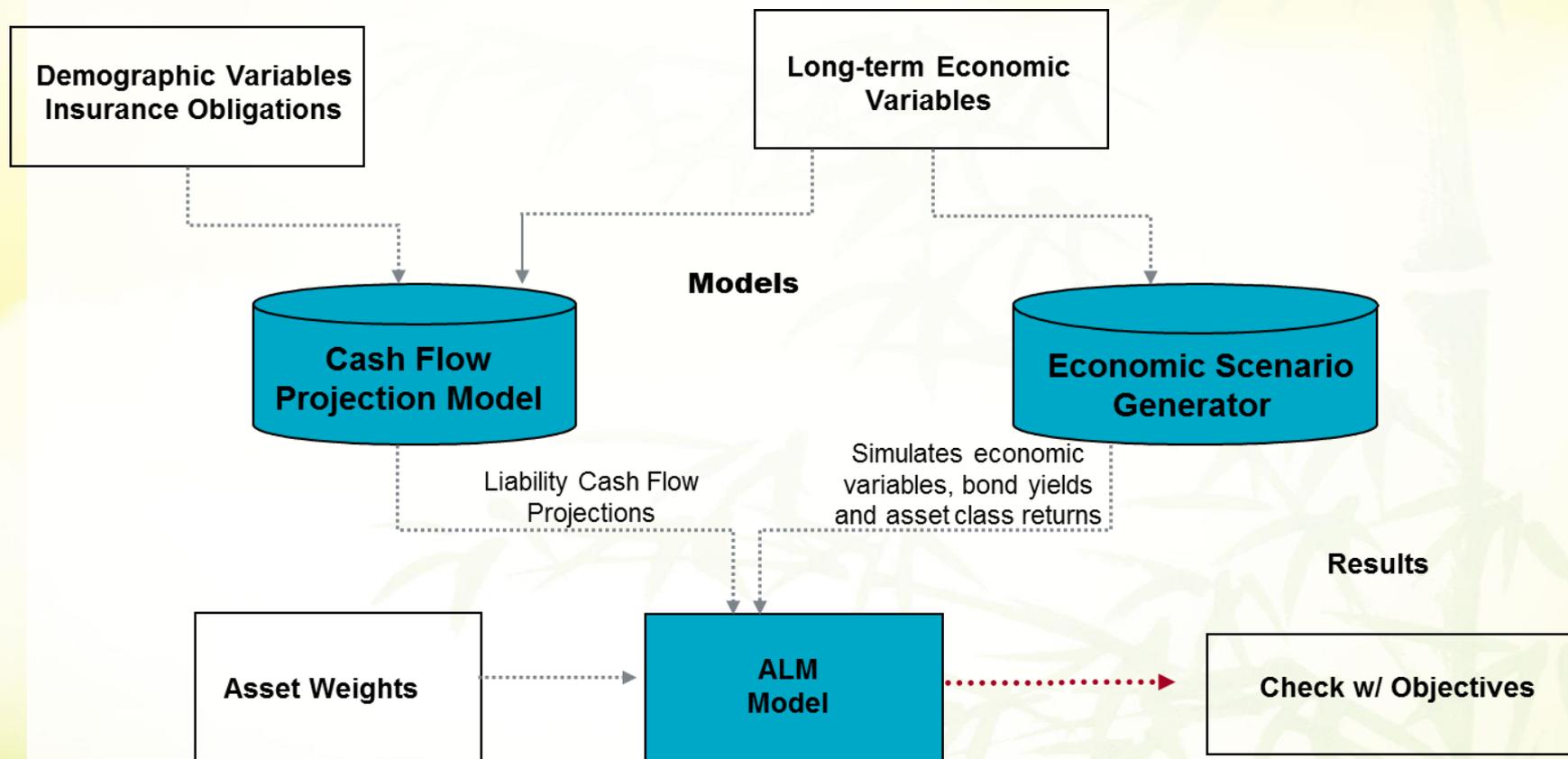
- Build in cost of capital into pricing
 - Determine future required capital
- Investment decisions
 - If you expect to continuously experience a positive cashflow (for eg for general insurers), you can consider investing in high risk assets like equities
 - However ensure reward is sufficient – needs to provide returns with a reasonable level of probability that takes into account your risk appetite

ALM APPLICATION

Applying ALM in Practice

- Relationship Model
- Is the ESG output reasonable?
- Determination of basis and treatment of New Business
- Making a meaningful analysis

Relationship in an ALM Simulation



Relationship in an ALM Simulation

- Asset model provides risk free yield curve for valuation interest rate, on top of asset returns
- The ALM module, after taking into account the asset & liability cashflow model inputs, calculates
 - Reserves
 - Asset values
 - Asset Share
 - Solvency & Capital requirements
- It can be used to generate a revenue account for the projection period

Is the ESG* output reasonable?

- Is the future really random?
 - Is market performance independent of the past and will not have any influence in what is expected to happen in the following year?
 - Generations of yields of different maturity terms cannot be modelled independent of each other
 - Scenarios need to show consistent year on year movements as evidenced by historical data
 - Need to use mean reversion techniques, BUT even then a qualitative overlay is still required to adjust for starting period bias

* ESG: Economic scenario generator

Is the ESG output reasonable?

- Distribution of returns
 - may not be a normal distribution. The non-normality is challenging when are considering the tail risk of extreme scenarios
 - should at the very least take into account the mean and volatility of each asset returns
 - Correlation between each asset class

Determination of Basis for Business

- On-going business
 - New business coming in effectively extends the duration of the liabilities
 - In a closed new business environment, liquidity may be an issue in meeting claims
- Analysis by cohorts of business where there is a clear liability – for e.g. on short term endowment products

Determination of Basis for Business

- In each scenario, assumptions need to be consistent for both assets and liabilities.
 - Downturn in economic scenario may have an impact on lapses, reduce new business, and even perhaps result in higher claims (for eg on medical business)
 - The model need to capture likely policyholders behaviour under different economic scenarios

Management Intervention

- The corporate model can allow for management's decision before it continues the simulation for the next year
- Management decision may include
 - When to rebalance asset allocation
 - For participating business, the model may incorporate managements' decisions on whether to reduce bonuses in poor economic conditions

MAKING A MEANINGFUL ANALYSIS

Making a Meaningful Analysis

- Solvency requirement is no longer straightforward and under a risk based capital framework, has many drivers.
- It is mainly influenced by the liability profile, the assets held, and the matching strategy. The last item is captured via the interest rate risk charge (which captures the difference in movement of assets and liabilities from a change in interest rate).
- Liability risk charges meanwhile capture the capital that is required to meet a 1 in 20 chance of ruin in one year.
- Asset charges would depend on the investments held and the mandated schedule of charges.

Making a Meaningful Analysis

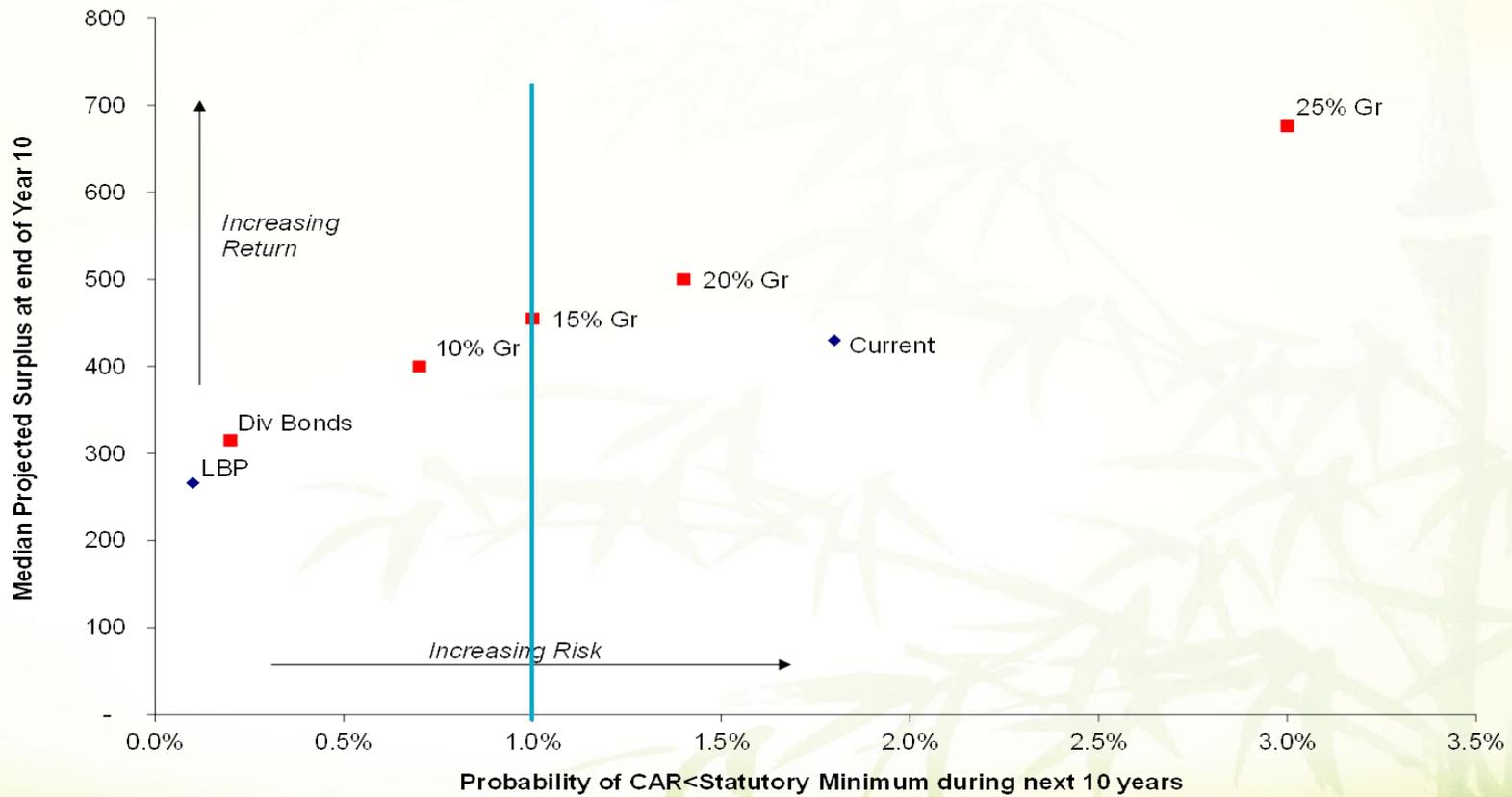
- Liability and solvency requirement changes with movements in interest rate. Asset values are marked to market (except perhaps held to maturity fixed interest investments). The interrelationship between the three has an impact on the Solvency Ratio and the all important Capital Adequacy Ratio (CAR).
- Should CAR at any time drop below a supervisory limit, there is a risk of regulatory intervention. Managing this Capital Adequacy Ratio hence requires investigating the likely movement of the surplus of assets over liability requirement (free assets) and that of the capital requirement.

Making a Meaningful Analysis

- If management is risk averse, the safest investment policy is that of matching current liabilities wherever possible.
- However if management accepts that risk represents opportunity, and seeks to maximise returns to shareholders subject to an acceptable level of risk exposure, ALM is a useful tool to investigate the impact of different asset allocation strategy.

Case Study (illustrative purposes only)

Case Study : Non-Participating Fund Risk as probability of CAR in any one year falling below statutory minimum



Case Study

- This chart is an illustration of how different asset allocation strategy would have an influence over the probability of capital dropping below the statutory minimum requirement in the next ten years within a non-par fund.
- Given that more conservative strategies would also mean lower returns, this chart plots the median projected surplus at the end of the tenth year on the y-axis. This surplus is the median surplus of running a large number of simulations for each asset allocation strategy.

Case Study

- From the above, if management's risk tolerance is 1%, a suitable asset allocation strategy is a combination of a matching portfolio and 15% of assets in a growth portfolio.
- In this particular example, comparing this to the current investment strategy (Current), this provides a slightly better return but with almost half the probability of ruin. Given that all excess returns in a non-par fund accrue to the shareholders while it bears all losses, this is a much better strategy.

Other use of ALM to Manage Risks

- Once an ALM model is set up, they are myriad of investigations that can be performed
 - to manage solvency requirements,
 - to arrive at a matched portfolio, and
 - to manage policyholders expectation by testing expected returns and volatility of participating funds, even unit linked funds in insurance and participants fund in takaful
 - to manage bonus distributions

Other use of ALM to Manage Risks

ALM under RBC	ALM for Takaful
<ul style="list-style-type: none">• Managing the CAR, at fund level and at total level• Matching of assets to liabilities• Maximizing utilization of capital at a desired level of risk• Managing bonuses in the participating fund• Valuing guarantees for a particular asset allocation.	<ul style="list-style-type: none">• Managing volatility of the Participants Account• Managing surplus distribution policy (to Participants and Operator)• Managing CAR at the Participants Risk Fund and overall at the Operators' Fund.• Optimization of product mix from a Qard minimization perspective

Other use of ALM to Manage Risks

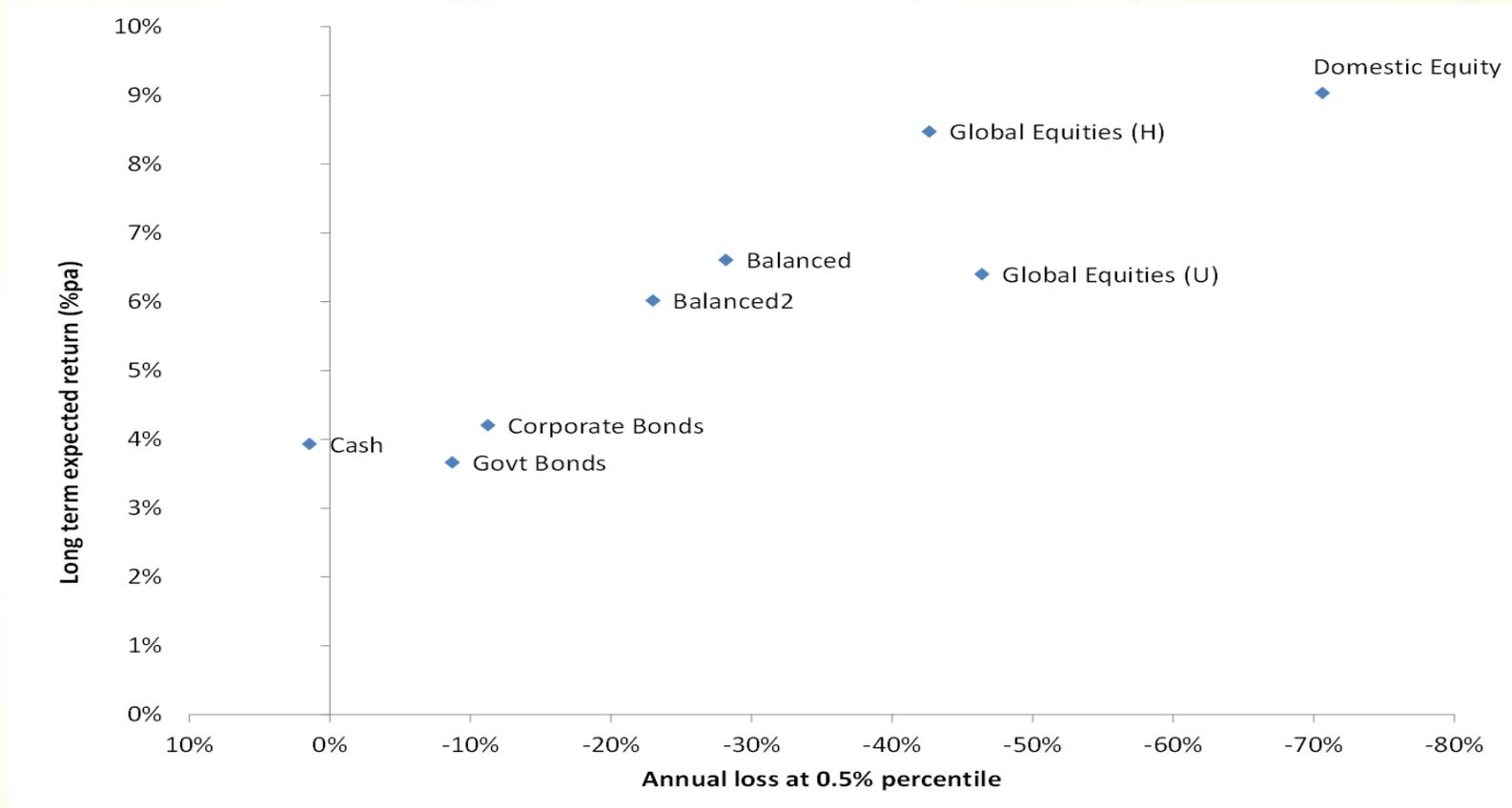
- For example, selling investment linked business is not without its risk. Depending on market conditions, policyholders may not afford future risk charges (when they are older and hence face higher mortality charges) from fund value – leading to a risk of forced lapse, and worse for the policyholder no insurance cover.
- One simple way of testing this is to run simulations of annual returns of each fund to test the probability of not achieving the pricing assumptions. As a responsible insurer which is required to Treat Customers Fairly, this is one calculation that is important to perform.

Other use of ALM to Manage Risks

- Another example may simply be to limit the losses that can possibly be incurred in any particular year.
- In the chart below we illustrate the worst case scenario (at 0.5th percentile) of a possible loss in any one year.
- We see that investing wholly in cash limits this loss but provide a lower return. Riskier assets provide better returns but carry a higher worst case annual loss.

Other ALM Exhibits (illustrative purposes only)

Other ALM Exhibits Risk Associated with Investment-Linked Products



Building blocks of an SAA

Use of ALM to Determine SAA*

- Two major business decision for management :
 - What products to sell & how much
 - What to invest in
- One of the definitive uses of an ALM is to determine a Strategic Asset Allocation (SAA).
- The SAA defines the management's long term asset allocation strategy. This entails combining the technical expertise of senior management from the investment department, the risk management and actuarial.

* Strategic Asset Allocation

Building Blocks of an SAA

We simplify the building blocks of an SAA into 7 steps below;

1. Understand the risk profile of different stakeholders.
2. Formulate fund objectives for the SAA.
3. By considering expected liabilities, build a base asset portfolio to meet “guaranteed” or non-discretionary liabilities.
4. Run simulations of assets against liabilities for different strategies of combining base portfolio with $x\%$ exposure in “growth” assets.
5. Compares results against stated objectives to choose “candidate” portfolios.

Building Blocks of an SAA – (con't)

6. Stress test “candidate portfolios” to ensure a suitable SAA is chosen.
7. Formulate an investment policy around the chosen SAA. As mentioned above, the SAA is a long term asset allocation designed to meet long term objectives. There can be opportunities to temporarily diverge from SAA to either profit from market conditions or manage a liability profile. Thus an SAA should also include a dynamic asset allocation plan to be complete.

Closing comments

Increasing ALM use in Future

- Given that it gives clarity to objectives, it is no wonder that management of takaful and insurance companies are under pressure to demonstrate ALM use. In fact, most companies have long moved from considering assets and liabilities separately.
- However, this has only meant for many, a move into fixed interest securities at the expense of better returns from growth assets. This was initially done to minimise RBC market risk charges and to better match non-discretionary or guaranteed type benefits.

Increasing ALM use in Future

- As the market matures, given the advancement in technology, and given that the regulatory framework governing reserving and solvency is now clear and its application under control by companies' internal software, it is time for management to take the next step of managing effectively the different concerns of their various stakeholders and in a more dynamic manner.
- For the shareholders, their concerns may mean more effective use of their capital and for participating policyholders, better returns on their policy.