Asset Liability Management in Insurance Companies.
Asset Liability Management is a procedure which allows us to gain an understanding whether the company’s assets would be sufficient to meet the company’s liabilities arising in the future from all the existing in force business as on the valuation date.

To sum it up simply, it consists of **3M’s**:

- **Match**
  - To match assets & liabilities in terms of nature, currency and duration. Also Cash flows are projected.

- **Manage**
  - To manage and monitor the portfolio in case of cash flow mismatch or duration gaps

- **Maintain**
  - To maintain the solvency position of the company
FLOW OF THE PRESENTATION

- Why do we need ALM?
- What does the ALM study comprise of?
- What are the different types of risks?
- What do we mean by Cash flow/Duration Matching?
- Our assumptions, methodology & Stress Test
- Limitations & Shortfall
- Our conclusions & recommendations
The most certain word is “uncertainty”..

The future is full of such uncertainties.

Outcomes in the future could be better or worse than what was envisaged.

The Destination?

ALM serves as a road map.
THE CORE STUDY COMPRISSES OF:

- Projections of the expected liability and asset cash flows
- To ensure that these cash flows are matched well in term of timings and amount.
- In case of a mismatch, preventive measures & strategy to adopt
- Identifying the different types of risks that predominantly exist in a portfolio
- Analysing the impact of these risks on the portfolio and the cash flows
- Assessing and Managing the risks by mitigate/eliminate/transferring etc.
RISKS

- Insurance Risk
- Systemic Risk
- Other Risks
- Reinvestment Risk

Credit Risk
- Credit Spread Risk
- Default Risk
- Interest Rate Risk
- Equity Risk
- Currency Risk
- Liquidity Risk
- Property Risk

Product Risk
- Mortality Risk

Operational Risks
- Model Risks
- Strategic Risks

Model Risks
- Reputation Risks

Strategic Risks
- Operational Risks

Reputation Risks
- Political Risk
- Regulatory Risk
Cash-flow Projections

• Data required for Liability Projections:
  - Policy-wise Data
  - Plan details & Benefit Structures
  - Expenses

• Assumptions:
  - Mortality/Morbidity/Longevity
  - Surrender/Lapse
  - Future Bonus Allowance
  - Future Inflation on expense
  - Discount rate
  - Investment return on reserves

• Data required for Asset Projections:
  - Entire Asset portfolio
    - Market Value
    - Purchase Price & Purchase Date
    - Coupon rate & Frequency
    - Maturity Date
    - Book Value
    - Asset Class
    - Units Held
Based on the above assumptions, liability cash flows are projected on the **best estimate basis**, i.e. base case scenario.

For every year, net cash flow is generated. Net cash flow is the difference between cash outflow and the cash inflow.

\[ \text{Net Cash flow} = \text{Cash outflow} - \text{cash Inflow} \]

This net liability is generated for every policy on a year on year basis.

The total net liability is then summed for every policy for all plans for the respective years.

The Expected value of liabilities consists of Death / Maturity/ Survival Benefits.
**Asset Projections:** In a similar way, cash proceeds generated from assets are projected using the coupon rate till the maturity on a year on year basis.

**Cash flow Matching:**
- For every year, asset and liability projections are matched in terms of amount & duration.
- Spot Mismatch
- Design a suitable Reinvestment Strategy
- Altering Investment Strategy
Stress Tests
Worst Case Scenario
NEED FOR DURATION MATCHING

- Interest rate Sensitivity that is not covered by cash flow matching
- Parallel shifts in the interest rate curve can be captured by duration matching
- Immunisation: 3 principles
- Shortfall: Duration matching doesn’t cover the tilts & bend in the interest rate curve
But What is Duration??

**Macaulay Duration**

The weighted average term to maturity of the cash flows from a bond. The weight of each cash flow is determined by dividing the present value of the cash flow by the price, and is a measure of bond price volatility with respect to interest rates.

**Macaulay Duration**

\[
D = \frac{\sum_{t=1}^{n} [CF_t \ast t / (1+i)^t]}{\sum_{t=1}^{n} [CF_t / (1+i)^t]}
\]

**Modified Duration**

Modified Duration

\[
D = \text{Macaulay Duration} \cdot \frac{1+YTM}{n}
\]

**Modified Duration**

A measure of the price sensitivity of the bond to interest rate movements

Price Sensitivity

= Approximate % change in Price

= \(- D \times \text{yield change in decimals} \times 100\)
DURATION - HOW DOES IT AFFECT?

Weighted average of time to recover (or receive) principal and interest

Higher Duration

Greater Price Volatility

Higher Interest Rate Risk

Lower Coupon Payments
Longer Term to Maturity
Lower Market Interest Rates
Calculating Duration for:

1. Liabilities: Positive and negative cash flows separately. Using an appropriate “i”
2. Assets: Cash flows generated using YTM for individual bonds

After finding out the duration. What next??

- Duration Buckets
- Duration Analysis: Finding out the duration for the entire asset and liability portfolio
- Interest rate Sensitivity Analysis: Assessing how much would the movements in the interest rate affect the duration
- Duration Gap Analysis
- Immunizing the portfolio
DURATION GAP ANALYSIS

DURATION OF LIABILITIES ($D_L$)

DURATION GAP ($D_G$)

DURATION OF ASSETS ($D_A$)
To go short on securities with a lower term and long on securities with higher maturities

- Reduce $D_L$, increase $D_A$
- Change leverage and increase $D_A$
- Adopt a suitable reinvestment strategy

Goal is to get $D_G = 0$, so there is no effect on earnings (and net worth) from an interest rate change
Immunising the portfolio in modern times becomes difficult. Continuous rebalancing of the portfolio is needed.

Quantifying some risks like operational, liquidity etc becomes challenging.

Systematic risks cannot be eliminated. One would have to bear those risks.

The correlation between different asset classes is difficult to quantify.

*Correlation is often not Causation*

Mostly, the asset portfolio comprises of securities across the globe. It is impossible to predict the hit on our asset portfolio due to events occurring across the world.
CELEBRATING 70 YEARS

THANK YOU