

## Asset Liability Management in a Low Interest Rate Environment

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## Agenda

- 1. Likely stakeholders
- 2. ALM framework considerations
- 3. Low interest rate environment
- 4. ALM some practical considerations



# How do we implement a framework that allows the Investment function to take on appropriate Investment risk?







#### Likely Stakeholders in forming an ALM Framework What each stakeholder might want to gain from the exercise?

#### Investment



- 1. Sensible limits, remove unnecessary restrictions
- Understand how investment decisions affect various outcomes (eg. capital, dividends)
- ALM Decisions should not affect the Investment team's scorecard

## Actuarial / Finance



- Manage financials: Earnings Capital position Planned dividends
- 2. Keep risk exposures within Risk Appetite / limits
- 3. Pricing and product considerations



## Likely Stakeholders in forming an ALM Framework What each stakeholder might want to gain from the exercise?



Demi Moore, as Chief Risk Officer in Margin Call (2002)

Risk Risk is well managed with:

- **Clearly articulated Risk** 1. **Appetite Statements**
- Appropriately granular 2. risk limits,
- 3. **Effective Risk Monitoring Process**
- 4. Appropriate regular review of the framework

Board Comfort that management are achieving the required shareholder returns and effectively managing the risks \*Owns the ICAAP.

**Shareholders** 

**Policyholders** 

Audit

Regulators



## **Hedging Objectives**

Which is more important to your company?

- 1. Manage earnings volatility?
  - Match profit (5 years)
- 2. Ability to remit planned dividends?
  - Protect the excess assets position (7 years)
  - Minimise regulatory capital charges (6.5 years)

3. Combination of above depending on the risk appetite?

• Switching objectives

Can't hedge both at the same time!

## **ALM Framework in practice?**

6.7 years Asset Duration

= 6.8 years



Actuarial sets the Target Asset Duration = 7 years



7.3 years

In this example, a 0.5 year operational or tactical deviation from the Target will attract an ALM capital charge that is equivalent to 0.5% of the value of supporting assets.





## ALM Framework – Overall Asset Risk Appetite / Risk limits



#### **Interest Rate Risk Appetite**

allows for sufficient operational flexibility and the ability to take on modest tactical interest rate risk

#### **Credit/Equity Risk Appetite**

survive a severe but plausible (Target Surplus) event

Operate within risk limits



#### Challenge appropriateness





## ALM Framework – Risk Monitoring Process

Example of Asset Key Risk Indicators

Accot KDIc	Dick Apportito	Risk	Risk
ASSELIKIS	KISK Appetite	Exposure	Limit
Overall Investment Risk	Remit dividends	9.9%	10%
Credit Risk	Survive stress event	7%	7%
Equity Risk	Survive plausible stress event	1%	5%
Interest Rate Risk	Sufficient operational/tactical flexibility	1.3%	0.5%

Build risk monitoring tool



- Challenges: Assets are re-valued daily while liabilities are re-valued less frequently.
- Target could change due to changes in liabilities between liability valuation dates.
- Once Target is set, the Investment function has X days to implement Breach Reporting (Interest Rate Risk):
- Breaches in Asset KRIs due to deviation from Target should be reported by Investments to the appropriate risk committees, along with the reasons and restoration plans

Daily/weekly monitoring



Challenge effectiveness





## ALM Framework – Breach Reporting further complications



There may be complex liability features that can't be fully hedged, this may incur an ALM charge even when the Target is achieved.

## Within Investment's control Breaches due to deviation from Target should be <u>reported by Investments</u>

#### Not within Investments control

Breaches due to changes in liabilities profile should be <u>reported by Actuarial</u>,

along with the reasons and restoration plans with an appropriate timeframe



## ALM Framework – Other Considerations

Capability

- to operate an interest rate derivative program?
- to build the tools to support the Asset Risk monitoring process?

Complexities of the liability profile

- Challenges in finding assets to match the liability profile.
- Feasibility and costs associated with better matched cashflows / bucket durations?
- Volatility of the Target Asset duration? Frequency of re-balancing vs. cost of re-balancing

Hedging Instruments

 Considerations related to government futures, Interest rate swaps, swaptions? eg. collateral requirements

Group wide ALM strategy

- Greater alignment to group objectives
- Manage risk exposures across the group



## Low Interest Rate Environment

- Discussions related to a low interest environment are typically related to product design and policyholder behaviors (annuities, GIMBs etc.)
- From a return on regulatory capital perspective:
  - Credit Risk capital charges ~ 6%
  - Equity/Property Risk capital charges ~ 35%
- Implications
  - Stark differences in capital charges may limit the appetite for growth assets.
  - In a low interest rate environment, the Insurance industry may not perform as well relative to other unregulated industries
  - Industry concentration on credit risk



## Low Interest Rate Environment – What could be done?

- Limited options within the constraints of LAGIC
- Influence APRA to consider an alternative approach in setting capital risk charges:
  - Start with a view of an ideal SAA that is appropriate for the Industry with an appropriate weighting for growth assets:
    - Have tiered capital charges that encourages the ideal SAA; If the ideal SAA should have a 20% allocation to growth assets, have an appropriately lower capital charge for growth assets up to 20% and ramp up the capital charges if exposures exceed 20%.
  - Reporting considerations to reduce noise from movements in credit spreads driven by market sentiment:

Consider the use of "Matching adjustments" or "Volatility adjustments"
<u>https://www.actuaries.org.uk/documents/solvency-ii-health-insurance</u> [paragraph 2.2.1.2]

# ALM – Some Practical Considerations

- a. The L in ALM
- b. The A in ALM
- c. The fallacy of the "perfect hedge"
- d. ALM "Control Cycle"
- e. Other considerations



- To enable effective ALM, accurate, timely & appropriately granular liability cash flows are essential
- Liability cash flows need to accurately distinguish interest / inflation rate sensitive vs non-sensitive cash flows
- There is a strong link between liability economic assumptions & effective ALM strategies.....



- Effective ALM strategies are dependent upon liability economic assumptions that are set on an ongoing, market-related basis.
  - You cannot effectively hedge an assumption that is set based on professional judgement!
  - Nor an assumption that changes only once a year!
  - This is more complex than it sounds and affects what ALM strategy & what assets/derivatives will be most effective.



- For interest rate exposures to be managed, assumptions should be set:
  - Monthly
  - Based on a market rate e.g. swap rate or government bond rate
  - Based on a full curve rather than a single point on the curve representing average duration, or a truncated curve
    - cash flows don't all occur at one average point!
    - Best estimate of actual economic impacts follows a market interest rate curve



- For inflation rate exposures to be managed, assumptions should be set:
  - Monthly
  - Based on a market index break even inflation (BEI) or inflation linked government bonds
  - Similarly, based on a full curve, not a point on the curve representing average inflation duration, or a truncated curve
  - Need to understand inflation related cash flow components consider if cash flows really are linked to market inflation and so should be managed by ALM strategies.....



- Inflation linked cash flows may include:
  - Inflation on Income Protection Claims in Course of Payment relatively clear link to CPI
  - Renewal Expenses much more tenuous link as real expenses don't just inflate at CPI. Depends on wages growth, project investment and ability of business to control cost growth.
  - Sum Insured growth future claim cost growth offset by future premium revenue growth. Economic impact depends product design (caps & floors), customer behaviour (opt out levels) and pricing (offset between future claims vs premiums)
- All may need to be treated differently and some may not be able to be effectively managed using ALM strategies (depends risk appetite)





- What strategy to use "Matching" vs "Hedging"?
- Matching involves the use of real assets (nominal or inflation linked government bonds) of durations or cash flows to "match" liabilities
- Hedging involves the use of derivatives (interest rate swaps, inflation swaps, bond futures) to offset movement in liability values



- Considerations on which to use:
  - Granularity, stability & update frequency of liability cashflows
  - Size of exposures to be managed (can exceed physical asset base in some circumstances)
  - Precision of outcomes ALM required
  - Trading frequency and costs
  - Whether liability economic assumptions are set on a curve or point in time
  - Whether liability economic assumptions are set based on swap or bond yields (more on this next)



No matter how good your ALM program is, some risk always remains to strategy effectiveness – you can mitigate but not eliminate risk.

## • Data Timing risk:

Time lapse between recalculating liabilities, provision of updated liability cash flows and implementation of asset / derivative trades, where you remain exposed to sharp changes in market interest / inflation rates.

Shorter lapse = lower impact (but not zero)



• Liability estimation risk:

Liabilities are not "real" cash flows – they are best estimates.

Model changes, "high level" adjustments, periodic changes to non economic assumptions and actual experience vs assumptions all create step changes i.e. mismatches which can't be hedged / matched.

Communication / collaboration between actuarial (liability) & investments (asset) teams is key.



• Basis risk:

The market has two different indices / curves that can be targeted as representing market interest rates or inflation – one based on the swap curve, the other the government bond curve

- •These can be quite different and can move differently over time (the spread between them widening or narrowing along the curve)
- If liability assumptions are set on the swap curve, using physical assets or bond futures can create a significant mismatch risk
- •Conversely if liability assumptions are set on the bond curve, using swaps can create a significant mismatch risk
- •Consistency is key to mitigate this risk



• Curve risk:

Interest & Inflation rates of different durations do not move in parallel. Rates curves can and do twist.

- If liability assumptions are set using a point in time / average duration, matching / hedging cash flows across the curve can create a significant mismatch risk
- Bond Futures are only available at 3 year & 10 year terms (with some limited market now at 20 years), which introduces curve risk when utilised
- Similarly real assets may not be readily available at all required durations (especially long durations) so can also result in curve risk
- Difficult to mitigate unless assumptions are set on swap curve & swap hedging utilised to manage



## Curve and Basis Risk

No longer as stable as historically, or as simplistic approaches assume e.g. duration or 'single point' matching.





# ALM "Control Cycle"

Like most things in life, an effective ALM program follows a Control Cycle approach....

Three steps process:

- Step 1: Ex-Ante Analyse and understand the interest rate and inflation risk exposures and gaps.
- Step 2: Optimisation Determine the amount and types of hedges / physical assets of different terms / durations to manage the risks identified in Step 1.
- Step 3: Ex-Post Performance attribution analysis to understand the effectiveness of the hedges determined in Step 2 by understanding the actual results. This can provide insights into previously unknown variables and thus refining future hedge effectiveness.

Regular and transparent monitoring & report reporting is essential.



Step 1: Perform risk analytics to understand the risk exposure of the portfolio. This allows better ALM management, i.e. understanding the interest rates KRD (Key Rate Duration) profile allows us to manage the gap along the curve thus reducing curve risk.





#### **Risk and Exposure**

						Portfolio KRD Dollars										
Security Description	Duration	Duration Dollars (mm)	Convexity	Inflation Duration	Inflation DV01	ЗМ	1Y	2Y	ЗY	5Y	7Y	10Y	15Y	20Y	25Y	30Y
CMLA_RTNP	2.91	6,946	0.56	-2.05	-489,082	183	59	1	-524	733	367	131	2,251	1,362	1,454	928
• CASH	0.12	74	0.00	0.00	0	74	0									
• FUND	0.21	196	0.00	0.00	0	167	28	-0	0	-0	0	-0	0	-0	0	1
• FUTURE	4.54	-4,341	0.32			31	-30	-400	-1,126	-385	-569	-1,711	-151			
• IBND	5.80	5,167	0.50	-5.49	-489,082	4	22	295	564	1,031	866	1,404	980			
+ SWAP	-263.55	5,849	-53.78			-95	40	105	38	87	70	438	1,422	1,363	1,454	928



Step 2: Using a Portfolio Risk Optimisation Tool to manage interest rates and inflation risks - User can select the hedging instruments required and insert any constraints (i.e. 0 duration & minimizing KRDs) and the system automatically calculates the amount to transact.

PortfolioRiskTools				9	ង a	laddin	by BLACKROCH
			R	TNP Interest Rate	e Hedge	✓ ⊡	🖊 auto run 🤇
Risk Calc Time Series Risk Matrix							
			L	1	09	.75 ups	12.32 Ups
				1	15	.17 bps	15.17 bps
SUM OF SQUARED EXPOSURES Rates				10		1.46	1.04
Constraints: Choose Constraint Type to Add	0	Lowe	r Bound	Upper Bound		Initial	Realized
- MAXIMUM TURNOVER			0	20			
- NOTIONAL BUDGET			0	100			
- EXPOSURE AUD_IR	B.		0	0		0.02	-0.00
		Trading Un	ite		~	Soloct Colu	mne 🔳
		Trading on	1.5		•	voria ⊤	v New
Edited Only Show Errors Find:	Invert	Unit	<b>A</b> m	ount Optimi	ze 🥐	Risk	Risk
CMLA_RTNP vs LIAB_RISK	Break down as	$\checkmark$				100.00%	94.64%
- AU00010A0 - M:1Y S:0 SWAP/SWAP, GEN, AUD		Notional	-118,382	,658 ?			
- AU00020A0 - M:2Y S:0 SWAP/SWAP, GEN, AUD		Notional	-2,134	,834 ?			
- AU00030A0 - M:3Y S:0 SWAP/SWAP, GEN, AUD		Notional	226,356	,510 ?			
- AU00050A0 - M:5Y S:0 SWAP/SWAP, GEN, AUD		Notional	-133,605	,207 ?			-0.87%
- AU00070A0 - M:7Y S:0 SWAP/SWAP, GEN, AUD		Notional	-101,739	,504 ?			
- AU00100A0 - M:10Y S:0 SWAP/SWAP, GEN, AUD		Notional	53,683	,712 ?			4.33%
- AU00150A0 - M:15Y S:0 SWAP/SWAP, GEN, AUD		Notional	-64,799	,120 ?			
- AU00200A0 - M:20Y S:0 SWAP/SWAP, GEN, AUD		Notional	8,103	,388 ?			1.61%
- AU00250A0 - M:25Y S:0 SWAP/SWAP, GEN, AUD		Notional	-4,241	,421 ?			
- AU00300A0 - M:30Y S:0 SWAP/SWAP, GEN, AUD		Notional	-1,065	,660 ?			-0.30%
Add Itom by Chartest/CUSID					Character	D-1	D'-l-
				Oria Active:	Stress	In 198	26 33M
				New Active:	11	91	8.46M

Illustrative only.



# Step 3: Performance attribution is used to present the ALM results, to understand the effectiveness of the hedges and ALM strategy.

Category	Name	Description	
Interest Rates	Key Rate Duration (KRD)	Changes in spot rate at each key rate points applied to each security's KRD.	
	Duration	Parallel movement in the local yield curve based on a designated spot rate applied to each security's Option Adjusted Duration (OAD).	duration adjusted for th first option provision (i.
	Curve	Changes in the shape of the yield curve, measured as difference between the sum of the key rate duration returns and the duration return.	adjusting for a call provision will shorten the second se
	Convexity	The rate of change in OAD & KRDs, given change in the security's local yield curve.	duration of a bond).
Carry Risk Free		The risk-free rate over the performance period, measured by the overnight rate for each security's respective local yield curve.	
1	Rolldown	Changes in discount rates resulting from passage of time.	
Foreign Exchange (FX		Change in spot FX rates.	
currency	FX Carry	Change in basis between spot and forward FX rates.	
	Option Adjusted Spread (OAS) Level	Accruing OAS over performance period (i.e. the risk premium) based on each security's OAS.	to be added to a benchm
	OAS Change	Change in spreads as product of each security's OAS and spread duration.	security's payments t
Spread and Other Factors	Swap Spread	Change in swap spread. Measured as product of security's change in swap spread and spread duration.	match its market price
	Inflation	Changes in inflation expectations. Measured by change in inflation curve applied to each KRD.	



# Other Considerations - Costs Vs Benefits There is no free lunch...

- Interest rate futures are cheap but limited in scope (curve and basis risk)
- OTC derivatives are more expensive but deliver a tailored outcome
- OTC derivatives are heavy on infrastructure:
  - Regulatory requirements (e.g.CPS 226)...which also add to cost (XVA)
  - Documentation: ISDA Master; Schedule to the Master; Credit Support Annexe – all carry obligations and legal fees
  - Operational setup to support mandatory collateralisation
- When considering frequency of rebalancing / adjusting positions consider benefit of better matching / ALM outcomes versus higher transaction costs.



# **Other Considerations**

Dealing will hundreds of millions or billions of dollars of exposures...

 Operational risk is real & can be significant - not an endeavour for a cottage industry. Important to invest in systems and technology to reduce inherent operational risk.

## The Importance of Data Accuracy - Garbage in garbage out

- · Accurate liability cash flows and asset and derivatives data
- Wrong data = wrong outcome = (potential) losses = Seek.com
- Costly to unwind or rebalance hedges so get it right the first time

## Other Practical Implications...

 Liquidity to cover derivative margin / collateral calls; swaps infrastructure including pricing capability



# A Word on 'Low' Interest Rates

Tempting to think rates are too low and not to hedge

- But 'too low' is relative to the past...
  - Past behaviour, including policy
  - Past relationships between variables fed into models
- Outcome: you model the past as a predictor of the future
- But who would have predicted a broken global financial market with:
  - Negative interest rates
  - Negative swap spreads (i.e. swap rates *below* government bonds)

### Consider: What is your roles responsibilities?

- Is speculating on market rates in your KPI?
- Does the Board have an <u>express</u> appetite for market risk? If so, how much?
- If NO to either of the above, what's the point? Remain market agnostic



# Some Final Thoughts...

- How much is on the table in terms of risk?
- How much is the business prepared to pay vs how much tolerance your Board has for volatility (P&L or Capital) arising from the ALM approach (or lack there of)?
- Effective ALM strategy MUST follow how liability economic assumptions are set ..... AND ..... these assumptions MUST be set on an ongoing, market-related basis to enable an ALM strategy to be effective!

