# Sanlam () IIZ Annual Conference

# Impact of Risk Hedging on Economic Capital

Klaas van Wyk de Vries CRO: Sanlam Emerging Markets

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**Financial Planning** 

Retirement

Investments

Wealth

#### **Agenda for the Session**





## Introduction



#### Introduction – Risks in Life Insurance





## Risk Hedging in Insurance



#### Introduction – Hedge-able Risks in Life Insurance





#### **Important Factors for Effective Hedging**





#### **Deep and liquid market**

Supply/demand for underlying instruments

> Active derivative banking market

#### Effective risk mitigation

Risk free rate should be determinable

Risk should be quantifiable

Business case for hedging

#### Full balance sheet view

Impact of hedging on entire balance sheet

Unintentionally introducing risk through hedge programmes

Qualitative risks of programmes



#### <u>Governance</u>

Sound and prudent management of the business

Transparency of programmes

Authorisation frameworks

**Operational capabilities** 

### **Framework for Market Risk Hedging**





## **Economic Capital**



### What is Economic Capital?

⊘ Different definitions for capital:

- $\bigcirc$  Accounting Equity = Assets less Liabilities:
  - ⊘ Share capital, share premium
  - ⊘ Distributable reserves
  - ⊘ Non-distributable Reserves
- ⊘ Regulatory Capital Capital adequacy in accordance with formula
  - Solvency II to factor based (e.g. 20% of premiums) normally a mechanism to protect policy holders
- S Economic capital company own measurement of capital shareholder view
- Economic capital should inform the insurer how much capital resources is employed to maintain the business (in-force book) and how much capital is needed for strategic growth



### **Risk Sensitivity of Economic Capital**



- Capital measure that results in higher capital requirements as risks increase on the balance sheet
- Market risk capital is calibrated relative to risk free assets (e.g. government bonds)
- Insurance risk capital is calibrated relative to the balance sheet impact of lapse, mortality, expense, etc...
- Main benefit is driving measured risk taking and prudent management behaviour
- ⊘ Importance of a market consistent approach
- ⊘ Various degree of complexity
  - ⊘ Calibration towards 1 in 200 year event



## Simple Example of Risk Sensitive Economic Capital

- ⊘ Market risk stresses:
  - S Equity risk charge 45% (EQ)
  - ⊘ Property risk charge 55% (PT)
  - Interest rate risk charge Larger of 150bps yield curve parallel stress (up and down)
- $\bigcirc$  Insurance risk
  - ⊘ Mortality risk charge Increase mortality rates by 150%
  - ⊘ Other (not for purposes of this example)
- $\bigcirc$  Operational risk charge = 25% of 1 year expenses



### Simple Example of Risk Sensitive of Economic Capital



	Base B/S	EQ Stress	Pty Stress	I/R Stress	MRT St	
Equities	5,000	2,750	5,000	5,000	5,000	
Properties	2,000	2,000	900	2,000	2,000	
Interest Bearing	5,000	<del>,,,,,,,</del>	<del>,,,,,,,</del>	4,000	5,000	
Cash	13,000	13,000	13,000	13,000	13,000	
Total Assets	<u>25,000</u>	<u>22,750</u>	<u>23,900</u>	<u>24,000</u>	<u>25,000</u>	
Policyholder liab.	(12,000)	1.2.0001	(	<u> </u>	(13,500)	
Other liabilities	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	
Total Liabilities	<u>(14,000)</u>	<u>(14,000)</u>	<u>(14,000)</u>	<u>(13,200)</u>	<u>(15,500)</u>	
Total Capital	11,000	8,750	9,900	10,800	9,500	
Economic Capital Risk Charges		2,250 🕂	1,100 🕂	200 🕂	1,500	



## Simple Example of Risk Sensitive Economic Capital

- Solution Solution
- Risks are normally correlated (to some extent) and there is a diversification benefit from this
- ⊘ (Assume full correlation between risk (Sqrt sum Sq) then the capital charge is 2,926)
- ⊘ Add on Operational risk charge (assume 500)
- ⊘ Total Capital Risk Charge (ignore correlation) = 5,550
- ⊘ Capital cover = 11,000/5,550 = x1.98





## **Asset Liability Management**

### **Asset Liability Management - Introduction**

#### ⊘ What is Asset Liability Management (ALM)

Management of insurance asset and liability cash flows; and insurance asset and liability values in order to minimise the profit volatility due to mismatches

Structure investment assets with predictable cashflows

- ⊘ Risks mitigated by ALM includes:
  - Solution Soluti Solution Solution Solution Solution Solution Solution S
  - ⊘ Credit risk
  - ⊘ Market risk
- ⊘ ALM Objectives
  - Minimise operating profit volatility
  - ⊘ Ensure adequacy of cash flows to meet policyholder liabilities
  - ⊘ Optimise economic (and regulatory) capital



### How does ALM Work?





### **Asset Liability Management – Risk Appetite**

#### **Example Risk Appetite Statements:**

- Solution The Board is willing to tolerate a maximum loss of 10% of Operating Profit due to ALM mismatches on Non-Participating Annuities
- Solution Solution
  - Parallel yield curve shift of 100bps (or approx. 10% of average risk free rate)
  - ⊘ Short end parallel stress of 50bps and long end parallel shift of 120bps
- Duration gap between assets and liabilities should not be negative (i.e. DMT assets < DMT liabilities) and should be shorter than 2 years</p>
- Asset and liability cash flows time buckets should be matched within a defined set of parameters (e.g. total bucket asset cash flow value should be 90% or more of liability CF values)



#### **Interest Rate Stresses**



#### Stressing the yield curve – determine profit sensitivity





### **Asset Liability Management – Example IR Stresses**

#### **Parallel Nominal Stresses - RSA**

The graphs below show the effect of a parallel shift of the entire yield curve on the difference between the assets and liabilities.





### **Asset Liability Management – Example RPP**



Nominal curve rand per points (current bond position)

Bucket Time Points	Liability RPP	Existing Bonds RPP	Existing Property RPP	Net RPP: A (incl Property)- L
15-09-17	-8,416.32	-9,017.12	449.84	-150.96
21-12-18	-2,150.68	-12,330.30	1,078.18	-9,101.43
15-01-20	1,176.34	-13,610.30	1,690.44	-13,096.19
31-03-21	-9,090.34	-51,020.23	2,332.70	-39,597.19
28-02-23	-19,181.30	-17,424.36	10,893.67	12,650.61
21-12-26	-71,821.09	-5,595.16	-154,447.50	-88,221.56
31-01-30	-13,954.36	-4,735.93	-107,869.71	-98,651.28
28-02-31	-73,700.90	-80,253.49		-6,552.59
31-03-36	-104,209.93	-111,214.78		-7,004.85
28-02-41	-115,855.48	-100,671.01		15,184.47
28-02-48	-824,964.59	-524,186.12		300,778.48
	-1,242,168.66	-930,058.81	-245,872.36	66,237.49
	Bucket Time Points 15-09-17 21-12-18 15-01-20 31-03-21 28-02-23 21-12-26 31-01-30 28-02-31 31-03-36 28-02-41 28-02-48	Bucket Time Points         Liability RPP           15-09-17         -8,416.32           21-12-18         -2,150.68           15-01-20         1,176.34           31-03-21         -9,090.34           28-02-23         -19,181.30           21-12-26         -71,821.09           31-01-30         -13,954.36           28-02-31         -73,700.90           31-03-36         -104,209.93           28-02-41         -115,855.48           28-02-48         -824,964.59	Bucket Time PointsLiability RPPExisting Bonds RPP15-09-17-8,416.32-9,017.1221-12-18-2,150.68-12,330.3015-01-201,176.34-13,610.3031-03-21-9,090.34-51,020.2328-02-23-19,181.30-17,424.3621-12-26-71,821.09-5,595.1631-01-30-13,954.36-4,735.9328-02-31-73,700.90-80,253.4931-03-36-104,209.93-111,214.7828-02-41-115,855.48-100,671.0128-02-42-824,964.59-524,186.12-1,242,168.66-930,058.81	Bucket Time PointsLiability RPPExisting Bonds RPPExisting Property RPP15-09-17-8,416.32-9,017.12449.8421-12-18-2,150.68-12,330.301,078.1815-01-201,176.34-13,610.301,690.4431-03-21-9,090.34-51,020.232,332.7028-02-23-19,181.30-17,424.3610,893.6721-12-26-71,821.09-5,595.16-154,447.5031-01-30-13,954.36-4,735.93-107,869.7128-02-31-73,700.90-80,253.49-107,869.7131-03-36-104,209.93-111,214.78-115,855.4828-02-44-824,964.59-524,186.12-245,872.36

SHORT





### **Asset Liability Management – Bucket Matching**





#### **Governance of ALM**



#### ⊘ Management Committee representing:

- ⊘ Asset Manager
- ⊘ Actuarial
- $\bigcirc$  Finance
- ⊘ Role of Internal Audit
- ⊘ Role of Risk Management
- $\odot$  Reporting to the Board



## Impact of ALM on Economic Capital



	Base B/S	Fully Matched	Mis- Matched	
Equities	5,000	5,000	5,000	
Properties	2,000	2,000	900	
Interest Bearing	5,000	4,000	4,000	
Cash	13,000	13,000	13,000	
Total Assets	<u>25,000</u>	<u>24,000</u>	<u>24,000</u>	
Policyholder liab.	(12,000)	(11,000)	(12,000)	
Other liabilities	(2,000)	(2,000)	(2,000)	
Total Liabilities	<u>(14,000)</u>	<u>(13,000)</u>	<u>(14,000)</u>	
Total Capital	11,000	11,000	10,000	
		0	1,000	

 Capital cover per previous example = x 1.98

• On a fully matched basis economic capital = 5,350

• Cover = x 2.05

Mismatched economic capital requirement = 6,350
Cover = x 1.7





## **Other Forms of Hedging**

Hedged Equity



Sequity risk is the risk of financial loss due to volatility in equity markets

- ⊘ Downside risk is typically unlimited
- ⊘ Risk vs reward equities normally yield higher than bonds and cash
- Hedged equity is a synthetic asset created to limit the down-side loss, but also cap the upside
- ⊘ Typical option structures are used:
  - ⊘ Upside cap -> short call (short an option to buy)
  - ⊘ Down-side floor -> long put (long an option to sell)



### **Hedge Equity Example**



- ⊘ Buy Underlying SWIX Index
- ⊘ Create Cap at 1,200
- ⊘ Create floor at 800

Counterparty will call on me to sell UL at 1,200





### **Economic Capital Impact of Hedged Equity**

- $\bigcirc$  Off-setting effect in equity risk charge
- $\bigcirc$  Example:
  - $\bigcirc$  On- balance sheet equity value = 5,000
  - $\odot$  Nominal value of equity hedged = 4,000
  - $\odot$  Thus capital charge is calculated on net position = 1,000
- ⊘ Thus lower capital charge



#### **Governance Measures over Equity Hedges**



- Ensuring that the hedges are in place for the full term over which economic capital is calculated
- Solve Rolling hedges need to be subject to controls to ensure that rolling forward is effective
- ⊘ Documentation of hedge programmes
- ⊘ Governance structures



### **Other Forms of Hedging**

#### ⊘ Currency Hedges examples

- Society Local currency UGX, but have USD expenses (e.g. rent) -> Hold USD currency to cover e.g. 3 months expenses
- Solution State State

#### ⊘ Credit Risk

- Solution State State
- Credit swap (e.g. AA- rating at 15bps spread vs BBB+ rating at 20 bps spread)



### Some Last Thoughts....

- ⊘ Capital management plan, policy and strategies
- Maturity of the organisation and ability to determine and monitor levels of risk
- ⊘ Risk appetite set by the Board
- Skills and expertise combination of Actuarial, Investments and Finance
- ⊘ Start small



