

Institute and Faculty of Actuaries

# How to set risk appetite for an insurance company - a practical case study

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## 1. Setting risk appetite - introduction

Good risk appetite statements need to address the interests of several different stakeholders

	Topic/metric	Example risk appetite undertakings	Example key stakeholders
Solvency	Regulatory capital	Solvency ratio >= 12% Core tier 1 ratio >=10%	Regulator, investor, business lines
Capital efficiency	Economic capital	Utilisation of total risk-bearing capacity <= 80% Utilisation of total risk-bearing capacity under stress <= 90%	Regulator, investor, business lines
Earnings	Dividends P&L	Probability of suspension of dividends <= 10% (1 yr in 10) Probability of P&L of zero or worse <= 5% (1 yr in 20)	Investor
Shareholder value	RAROC	RAROC >= 5%	Investor
Creditworthiness	Bond rating	Maintain rating of 'A' (or better)	Creditor, rating agency
Liquidity	Available liquidity	Net liquidity gap corridor not breached Probability of net liquidity breach under stress < 1%	Regulator, business lines
Reputation	Reputational risk	Zero tolerance for permanent brand/reputational damage	Investor

## **2. Setting risk appetite - return targets**

- Return on Equity (ROE) targets are also part of your risk appetite statements:
  - You can only target a higher return if you are willing to take more risk
  - Your ROE target shows how risky you want to be
- In the "old days" (before financial crisis of 2008), traditional target ROE figures were:
  - 5% from government bonds
  - 10% from equity markets
- Typically in 2015 (when "risk free rates" are very low):
  - Global Banks (systematic risk): CoC 10%-12%, target ROE ~12%-15%
  - Insurance(diversifying): CoC ~6%, target ROE ~10%

## Setting risk appetite - return targets

#### Return targets of multinational speciality (re)insurance groups

Company.	<u>Return target.</u>	Comment.
Hannover Re	750 bps over risk free rate.	( <u>i</u> )
Munich Re	15% RORAC after tax over the cycle.	(ii)
SCOR	900 bps over risk free rate over the cycle.	( <mark>i</mark> ii)
TM Group	8% over risk free net of tax	(iv)

(i) Hannover Re: while maintaining a AA level of security.

(ii) Munich Re: need to adjust for two features:

- Investment return on surplus capital included in this target.
- Actual capital (the E of ROE) is higher than Required Capital (RAC), by 63% at year-end 2009.
- Subtract 3% and divide by 1.63: 15% RORAC → 7.5% ROE.

(iii) SCOR: while maintaining an A+ level of security.

(iv) TM: while maintaining <u>a</u> AA level of security.

## 3. Capital at risk metrics

- When deciding how much capital to hold, need to consider two key issues:
  - What to use as your core risk metric
  - How much buffer capital to hold above required levels / what is your desired ESR (Economic Solvency Ratio)

## Why are there so many risk measures - which ones to use?



We need different measures for two different purposes:(1) For solvency & capital management(2) For allocation and business management

## Why VaR versus TVaR?

99.93%Va

39.97%VaR

# VaR looks at only one point on the curve

- Doesn't see cat exposures above 1/200
- Doesn't see XL RI bought above 1/200
- Doesn't see inward RI treaty limits exhausted





- TVaR is better for averages
- If you want to allocate between business units
- VaR cannot be split in a natural way





# Why distance from breakeven versus distance from mean?

Distance from breakeven (DFB)	Lose money: Amount of money that the company loses, i.e. how much policyholders could lose and not get claims paid	Who prefers this one? Policyholder Regulator Rating agency
Distance from mean (DFM)	Lose profits: Amount by which the company misses its profit forecast, e.g. the impact on the Group dividend	<ul> <li><u>Who prefers this one?</u></li> <li>Shareholder, because:</li> <li>Hits group dividend</li> <li>Hits shareholder value</li> </ul>

## **Two consistent risk measures**

	Distance from breakeven (DFB)	Distance from mean (DFM)
VaR	Regulator likes VaR 🗸	×
	Regulator likes DFB 🗸	×
TVaR	×	Shareholder likes TVaR 🗸
	×	Shareholder likes DFM 🗸

Yes we can make risk measures consistent, but we still need two different measures for two different purposes:
(1) For solvency & capital management (regulator)
(2) For allocation and business management (shareholder)

## How much capital buffer to hold?

Market practices in setting Risk Appetite and calibrating target capital levels have been evolving – Solvency II is a key catalyst for the recent evolution



## How much capital buffer do companies hold?

Peer	Target capital level
UK-based life insurer	<ul> <li>Regulatory solvent after a 1-in-10 year event on both Solvency II and ICA bases</li> </ul>
International, UK-based composite insurer	Regulatory solvent after a 1-in-10 year event on both Solvency II and ICA bases
UK-based composite insurer	<ul> <li>Regulatory solvent after a 1-in-10 year event on Solvency II basis</li> <li>50% buffer on ICA</li> </ul>
hannover <b>re</b>	Sufficient assets to pay liabilities in a 3-in-10,000 year (99.97%) event
CLCMUTUAL	<ul> <li>160% of assets required to pay liabilities in a 1-in-200 (99.5%) event</li> </ul>
Munich RE	<ul> <li>175% of assets required to pay liabilities in a 1-in-200 (99.5%) event</li> </ul>
RSA	<ul> <li>115% of assets required to pay liabilities in a 1-in-1250 (99.92%) event</li> </ul>
SCOR	<ul> <li>185% - 220% of assets required to pay liabilities in a 1-in-200 (99.5%) event</li> </ul>
UNIQA	• 170% of assets required to pay liabilities in a 1-in-200 (99.5%) event
2URICH	<ul> <li>100% - 120% of assets required to pay liabilities in a 1-in-2000 (99.95%) event</li> </ul>

## 4. Earnings at risk metrics

## Need a consistent view across many return periods: - Earnings shocks as well as capital shocks

The one year horizon is both the period over which the budget process is primarily focussed, and also the target horizon of most EC models, and underlying credit, market and operational risk calculations.

As a result, delivering a combined earnings distribution that reflects expected revenues, expected costs and expected losses, and also the unexpected losses modelled for EC purposes, is within the capability of most large financial institutions. The key requirement is that the institution has analysed the main sources of earnings volatility outside of credit, market and operational risk losses e.g. fee income and cost volatility.

Such a distribution allows us to discuss the likelihood of both earnings-related events, such as dividend suspensions or 'loss years', and solvency-related events, such as breaches of regulatory ratios, within a single framework that is consistent with allocation of economic capital and EC-based limits.

Purely from the solvency perspective, it is also valid to consider only the probability distribution of losses due to credit, market, operational and business risks that is typically used for EC purposes.



## Barclays briefly summarises its approach to setting appetite for earnings volatility in its annual report





# 5. Risk limits and risk triggers

- Need system of risk limits and risk triggers:
  - To turn high level company wide risk appetite statements into something that management can use on a day-to-day basis
- Bottom up:
  - Per risk limits for underwriters
  - Accumulation limits
- Top down:
  - Cascade
  - Risk triggers and reporting

# **Risk limits and risk triggers: examples (1/3)**

### Insurance risk

Qualitative:

- We will/will not write the following LOBs, territories, types of business, etc. (underwriting guidelines, referrals, escalation procedures).
- No more than 10% of acceptances to vary from core terms (in practice, needs to be more granular by LOB, territory etc).
- No more than 10% of acceptance wordings to be late by more than one month, no more than 1% late by more than 3 months (percent by number of acceptances or by EPI?).

Quantitative:

- Limits: per loss £25m, per event £200m gross / £25m net of reinsurance, PML or SI basis, target loss/systemic limits for long-tail liability exposures.
- Portfolio size: not to exceed planned premium £500m by more than 10%.
- No more than 10% of our premium with one client.
- No more than 25% of our premium with one broker.
- Net deductible on reinsurance programme not to exceed £25m first event, £40m two major events, £50m multiple events in one year.
- Not to accept achieved price more than 10% below technical price any one acceptance, total cash value of achieved price less technical price not to exceed deficit of £2.5m any one business unit/LOB etc.
- Reserve run-off deficit on prior year reserves not to exceed £25m any one LOB in one year, not to exceed £50m company total level more than once every 5 years.

# Risk limits and risk triggers: examples (2/3)

### Credit risk

Reinsurance.

- No reinsurer to be below A- grade.
- No one reinsurer to have more than 25% of the total programme any one year (in practice, needs to be more granular, defining split by limit or premium, by LOB etc).
- Liability to any one reinsurer (case reserves plus IBNR) not to exceed 30% of NAV.

Non-government bonds.

- No investment in non-government bonds to be below A- grade.
- Investment in non-government bonds not to exceed 30% of total bond portfolio.
- No single holding in a non-government bond to exceed £25m.

Counterparties.

- No intermediary or banking partner to be below A- grade.
- Balances owing (e.g. unpaid premiums) from any one counterparty not to exceed £25m over 1 month late, £5m over 3 months late.

## **Risk limits and risk triggers: examples (3/3)**

## Market risk

- Currency risk: technical liabilities to be matched by assets in designated currency, with tolerance no greater than +/-10%.
- Currency of surplus assets to be split 50% GBP, 30% USD, 20% EUR, with tolerance no greater than +/-10%.
- Assets supporting technical liabilities to be bonds duration 4.5 years, with tolerance no greater than +/- 2 years. (In practice, would set out a table of values and limits required at different maturities / durations).
- Surplus assets to be 60% stocks, 40% bonds, with stock split tolerance no greater than +/-20%, surplus bonds duration 6 years, with tolerance no greater than +/- 3 years.
- No one stock holding to exceed £25m in value by means of new purchase, only by strong growth performance. No one stock holding to exceed £50m in value

## Liquidity risk

- Holdings of cash and money market funds not to fall below £5m.
- Holdings of government bonds with maturity less than 3 years not to fall below £50m.

## Appendix: What do 1/200 and 1/1,000 mean?

Introduction.

In Europe / Solvency II, SCRs are quoted as being set at the 1/200 level, which is deemed equivalent to BBB security:

- A single A rating is quoted as being set at the 1/1,000 level.
- A double AA rating at 1/3,000.

The question is often asked "how can this be reasonable?":

- "1 in 200 years nobody lives that long";
- "1 in 3,000 that is far too remote to make sense".

This Appendix explores how to manage the business in a practical way against such remote objectives, and is also for the benefit of Directors who have duties to set risk appetite statements at extreme risk tolerance levels.

## **Risk tolerance levels and security rating**

S&P Rating	Moody's Equivalent	Default Probability (Subsequent year)	Coverage Level
AAA	Aaa	0.01%	99.99%
AA	Aa3/A1	0.03%	99.97%
A	A2/A3	0.11%	99.89%
BBB	Baa2	0.30%	99.70%
BB	Ba1/Ba2	0.81%	99.19%
В	Ba3/B1	2.21%	97.79%
ccc	B2/B3	6.00%	94.00%
CC	B3/Caa	11.68%	88.32%
С	Caa/Ca	16.29%	83.71%

Table 3 Estimated Default Probabilities By Rating Class

Source: Bank of America

The original research leading to the formation of this table was done by Bank of America. A version of the table is reproduced in a paper written by the Wharton School, a famous business school at the University of Pennsylvania. A copy of the paper can be found at http://fic.wharton.upenn.edu/fic/papers/96/p9640.html. This paper was published in the mid 1990s, and since then default rates on corporate bonds have decreased. However, analysts of insurance companies do not increase the required target survival rates, because it is felt that the reason for the lower recent experience of corporate defaults comes from improved trading conditions around the world in the last decade, globalisation and the benefit of the internet being quoted as key drivers. None of these are necessarily connected with a perception of lower risk from insurance companies, so the rates originally assessed in the mid 1990s are still used as a guide.

Also, European practice regards BBB for insurance as a 0.5% (1/200) default probability.

## How do you go from 1/200 up to the very remote levels?

Typical industry rules of thumb:

- Chart below shows capital at higher tolerance levels for lognormal with CoV 20%
  - This model replicates UK ECR calibration for a reasonably well spread retail insurance company

A M Best uplift factor:

stressed BCAR for AAA = 175% of exposure to 1/100 windstorm & 1/250 EQ

Different Risk Measures: CoV = 20%		Inve	stment Income	87.5			
					Expenses	(50.0)	
						· ·	
Inputs			<u>VaR claims</u>	<u>TVaR claims</u>	<u>VaR result</u>	<u>TVaR result</u>	<u>TVaR:DFM</u>
Premiums	1,000.0	10.0%	(722.7)	(982.2)	314.8	55.3	(32.2)
<u>Loss ratio</u>	95.0%	30.0%	(839.7)	(1,038.2)	197.8	(0.7)	(88.2)
<u>Claims</u>		50.0%	(931.6)	(1,099.1)	105.9	(61.6)	(149.1)
Best est	950	60.0%	(979.5)	(1,135.1)	58.0	(97.6)	(185.1)
CoV	20%	70.0%	(1,033.5)	(1,178.2)	4.0	(140.7)	(228.2)
Std Devn	190	80.0%	(1,100.5)	(1,234.6)	(63.0)	(197.1)	(284.6)
<u>Lognormal</u>		90.0%	(1,200.7)	(1,323.3)	(163.2)	(285.8)	(373.3)
Mu	6.837	95.0%	(1,290.3)	(1,405.5)	(252.8)	(368.0)	(455.5)
Sigma	0.198	98.0%	(1,399.1)	(1,508.0)	(361.6)	(470.5)	(558.0)
	100	99.0%	(1,476.7)	(1,582.3)	(439.2)	(544.8)	(632.3)
	167	99.4%	(1,532.1)	(1,635.8)	(494.6)	(598.3)	(685.8)
	200	99.5%	(1,551.5)	(1,654.6)	(514.0)	(617.1)	(704.6)
	250	99.6%	(1,575.1)	(1,677.5)	(537.6)	(640.0)	(727.5)
	333	99.7%	(1,605.2)	(1,706.9)	(567.7)	(669.4)	(756.9)
	500	99.8%	(1,647.2)	(1,747.9)	(609.7)	(710.4)	(797.9)
	1,000	99.9%	(1,717.9)	(1,817.2)	(680.4)	(779.7)	(867.2)
	3,333	99.97%	(1,838.0)	(1,935.7)	(800.5)	(898.2)	(985.7)
	10,000	99.99%	(1,945.7)	(2,042.3)	(908.2)	(1,004.8)	(1,092.3)
<u>Different rating levels</u>	1				<u>Capital</u>	<u>As % BBB</u>	
BBB	200	99.5%			514.0	100%	
A	1,000	99.9%			680.4	132%	
AA	3,333	99.97%			800.5	156%	
AAA	10,000	99.99%			908.2	177%	

## Stress and scenario testing – combinations of less rare events

- "1/1,000" seems very remote for one event on its own
  - Battle of Hastings (1066), Black Death (1350), Spanish flu (1919)
  - Supernova (1054), Ming Dynasty (1350-1650), Sichuan EQ (2008)
- But if events are fully independent, "1/1,000" can be "two at 1/32" or a range of combinations such as "1/50 plus 1/20" or "1/100 plus 1/10"
  - Plague (1665) & Great Fire of London (1666) happening same year
- The stress and scenario testing framework of the company should check that it can survive the whole spectrum of events of the nature of [1/50 + 1/20], [1/100 + 1/10] etc
- Munich Re state that they believe they have enough capital to "be able to survive two 1/100 events in one year"



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The views expressed in this presentation are those of the presenter.