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

Andrew Hitchcox, Chair of the Risk Management Board
Setting risk appetite - contents

1. Introduction: different stakeholders
2. Setting risk appetite - return targets
3. Capital at risk metrics
4. Earnings risk metrics
5. Risk limits and risk triggers

Appendix: What do 1/200 and 1/1,000 mean?
# 1. Setting risk appetite - introduction

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

<table>
<thead>
<tr>
<th>Topic/metric</th>
<th>Example risk appetite undertakings</th>
<th>Example key stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvency</td>
<td>Solvency ratio $\geq 12%$ Core tier 1 ratio $\geq 10%$</td>
<td>Regulator, investor, business lines</td>
</tr>
<tr>
<td>Capital efficiency</td>
<td>Utilisation of total risk-bearing capacity $\leq 80%$</td>
<td>Regulator, investor, business lines</td>
</tr>
<tr>
<td></td>
<td>Utilisation of total risk-bearing capacity under stress $\leq 90%$</td>
<td></td>
</tr>
<tr>
<td>Earnings</td>
<td>Probability of suspension of dividends $\leq 10%$ (1 yr in 10)</td>
<td>Investor</td>
</tr>
<tr>
<td></td>
<td>Probability of P&amp;L of zero or worse $\leq 5%$ (1 yr in 20)</td>
<td></td>
</tr>
<tr>
<td>Shareholder value</td>
<td>RAROC $\geq 5%$</td>
<td>Investor</td>
</tr>
<tr>
<td>Creditworthiness</td>
<td>Maintain rating of ‘A’ (or better)</td>
<td>Creditor, rating agency</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Net liquidity gap corridor not breached</td>
<td>Regulator, business lines</td>
</tr>
<tr>
<td></td>
<td>Probability of net liquidity breach under stress $&lt; 1%$</td>
<td></td>
</tr>
<tr>
<td>Reputation</td>
<td>Zero tolerance for permanent brand/reputational damage</td>
<td>Investor</td>
</tr>
</tbody>
</table>
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%
Return targets of multinational speciality (re)insurance groups

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

(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 $\Rightarrow$ 7.5% ROE.

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

(iv) TM: while maintaining a 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?

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 sees all of the risks
• Allows for more of the rare risk
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 | Who prefers this one?  
Shareholder, because:  
- Hits group dividend  
- Hits shareholder value |
# Two consistent risk measures

<table>
<thead>
<tr>
<th></th>
<th>Distance from breakeven (DFB)</th>
<th>Distance from mean (DFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VaR</strong></td>
<td>Regulator likes VaR ✓</td>
<td>◯</td>
</tr>
<tr>
<td></td>
<td>Regulator likes DFB ✓</td>
<td>◯</td>
</tr>
<tr>
<td><strong>TVaR</strong></td>
<td>◯</td>
<td>Shareholder likes TVaR ✓</td>
</tr>
<tr>
<td></td>
<td>◯</td>
<td>Shareholder likes DFM ✓</td>
</tr>
</tbody>
</table>

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

**Risk Appetite in Target Capital Setting**

Pre-Solvency II

- Target capital determined based on extreme tail probability of adequacy
- Implicit target capital buffer

Risk Appetite in Target Capital Setting

Following introduction of Solvency II

- Target capital now determined based on probability of breaching minimum capital requirements
- Explicit target capital buffer

1. Minimum Capital Requirements (MCR) determined under a formula-based approach under Solvency II; and
2. Solvency Capital Requirements (SCR) under Solvency II, determined based on a one-year value at risk approach at 99.5% confidence or 1-in-200 event
## How much capital buffer do companies hold?

<table>
<thead>
<tr>
<th>Peer</th>
<th>Target capital level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UK-based life insurer</strong></td>
<td>• Regulatory solvent after a 1-in-10 year event on both Solvency II and ICA bases</td>
</tr>
<tr>
<td><strong>International, UK-based composite insurer</strong></td>
<td>• Regulatory solvent after a 1-in-10 year event on both Solvency II and ICA bases</td>
</tr>
</tbody>
</table>
| **UK-based composite insurer**  | • Regulatory solvent after a 1-in-10 year event on Solvency II basis  
• 50% buffer on ICA                                                                    |
| **hannover re**                 | • Sufficient assets to pay liabilities in a 3-in-10,000 year (99.97%) event                                                                            |
| **Old Mutual**                  | • 160% of assets required to pay liabilities in a 1-in-200 (99.5%) event                                                                               |
| **Munich RE**                   | • 175% of assets required to pay liabilities in a 1-in-200 (99.5%) event                                                                               |
| **RSA**                         | • 115% of assets required to pay liabilities in a 1-in-1250 (99.92%) event                                                                             |
| **SCOR**                        | • 185% - 220% of assets required to pay liabilities in a 1-in-200 (99.5%) event                                                                           |
| **UNIQA**                       | • 170% of assets required to pay liabilities in a 1-in-200 (99.5%) event                                                                               |
| **ZURICH**                      | • 100% - 120% of assets required to pay liabilities in a 1-in-2000 (99.95%) event                                                                         |
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

Earnings Volatility: This is the level of potential deviation from expected financial performance that Barclays is prepared to sustain at relevant points on the risk profile. It is established with reference to the strategic objectives and to the business plans of the Group, including the achievement of annual financial targets, payment of dividends, funding of capital growth and maintenance of acceptable capital ratios. The portfolio is analysed in this way at four representative levels:

- expected performance (including the average credit losses based on measurements over many years);
- a moderate stress level of loss that is likely to occur only infrequently and is meant to correspond to a macroeconomic cycle;
- a severe stress which is much less likely;
- an extreme but highly improbable level of stressed loss which is used to determine the Group’s economic capital.

These potentially larger but increasingly less likely levels of loss are illustrated in the following chart.

**Risk Appetite concepts** (diagram not to scale)
Different businesses also contribute differently to the Group’s ability to maintain acceptable equity ratios under stress.

**Explanatory Legend**

- IBM 1-in-7 equity and RWA trajectory
- GR0B 1-in-7 equity and RWA trajectory
- Chart flows in this direction

**Note:** All figures shown are purely illustrative and are not associated Barclays’ risk profile.
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.
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.
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
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”
Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

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