Optimisation of limit systems for investment risks in accordance with Solvency II
Agenda

• Introduction
• Solvency control
• Risk capital and coverage
  – Top-down limit setting
  – Dynamics in the risk limit process
• Risk indicators for investment risks
  – Defining key risk indicators
  – Model risk and limitations
  – Integration of ALM approaches
• Dynamic limit setting in the investment management process
• Summary
Introduction

• Various types of limits
  – Limits for transactions (security trading), e.g.
    • Limits on the volume of transactions in a defined period
  – Limits for specific investments
  – Counterpart limits
  – Limits in the asset allocation process and portfolio limits, e.g.
    • Maximum exposure for specific countries and business segments
    • Duration based limits
  – Limits with focus on the relation between two different indicators, e.g.
    • Quota share of equity in the investment portfolio
Introduction

• Solvency analysis
  – Overall risk perspective
  – Adequateness of own-funds / “Available Solvency Margin” (“ASM”)
  – Top down risk assessment with focus on the whole financial position of the entity
  – Implementation of a risk limit system as major part of the overall risk controlling process

• Key assumptions
  – Economic valuation principles
  – Principles based approach

• Risk capital
  – Required capital to survive with a well-defined probability in the future
  – Controlling of “Solvency Capital Requirement” (“SCR”)
  – Analysis based on risk model approaches
Solvency control

- Available equity versus risk capital requirement

Assets covering technical provisions, the MCR and the SCR

Source: CEIOPS-CP-09/06, p.9, *MARKT/2515/04
Solvency control

- Negative impact on the entity’s solvency situation --- illustration ---

Raising the risk leads to exceeding the risk-capital requirement

Loss of equity leads to additional need for equity

- e.g. changed investment strategy
- e.g. decrease of market value of investments
Risk capital and coverage

• Dynamics of SCR and ASM

• Therefore: Limit setting for SCR
  – in relation to the current situation of available capital (ASM)
  – alt.: focus on the “Coverage Ratio” (CR)

\[
Coverage - Ratio = \frac{ASM}{SCR}
\]
Top-down limit setting

- Coverage ratio (CR) for investment risks (“IR”)

\[
Coverage - Ratio_{IR} = \frac{ASM_{IR}}{SCR_{IR}}
\]

- \(SCR_{IR} \rightarrow SCR\)
  - Bottom-Up aggregation and diversification

- \(ASM \rightarrow ASM_{IR}\)
  - Top-Down allocation of equity

Assumptions on correlations between risks
- Consistency ?
- Dynamics ?
Dynamics in the risk limit process

How fast can the solvency situation change?

- Setting limits (and alert levels) based on the current situation and the entities business (investment) planning
- Critical issues: Financial market shocks, valuation risks and model risks
Dynamics in the risk limit process

"Roll-forward“ limit setting and controlling

- Analysis of solvency based on 12/2008
  Focus on default until 12/2009

Interim analysis of solvency e.g. based on 6/2009
Focus on default until 6/2010

Interim analysis needed

- Analysis of solvency based on 12/2010
  Focus on default until 12/2010
Dynamics in the risk limit process

Strategic planning and simultaneous projection of ASM and SCR

Investment strategy & business planning
Market value of assets and liabilities
Projection of assumptions (volatilities, correlations, …)

Analysis of expected solvency in 12/2010
Focus on default until 12/2011

Follow-up analysis until t=T needed

Stochastic dependencies between both processes!

\[ E(CR_T \mid A_t \leq T) = E\left(\frac{ASM_T}{SCR_T} \mid A_t \leq T\right) \]
Risk indicators for investment risks

• Relevant criteria for defining key risk indicators
  – Focus on
    • Risk structure and risk categories including correlations between these risks
    • Model risk and limitations (e.g. limiting cases, extreme values, path-dependency)
    • Requirements of the ALM and asset allocation process
  – Overall requirements
    • Understanding and transparency
    • Promptly reporting
    • Consistency and materiality
Defining key risk indicators

- Examples for risk indicators (--- illustration---)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Market Value (Exposure of asset classes)</th>
<th>Volatility of investment portfolios</th>
<th>Rating structure</th>
<th>Credit Spread</th>
<th>Market and credit risk</th>
<th>Duration</th>
<th>Convexity</th>
<th>ALM risk</th>
<th>ALM risk (comparison to the guaranteed interest rate in the insurance contracts)</th>
<th>Net interest income</th>
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</tr>
</tbody>
</table>
Model risk and limitations

- Characteristics of investment risk factors
  - Distinction between
    - Handling “everyday” risk factors
    - Protection against unusual extreme events

- VaR based risk model approaches
  - Appropriate for focus on ordinary market development
  - Issue: Limitations of volatility based VaR approaches
  - Alternatives? (e.g. expected shortfall / TVaR)

- Stress Test approaches
  - Excellent for handling unusual shocks
  - But subjective and depending critically on judgmental decisions

- Interactions between the key risk indicators and the overall solvency control?
Integration of ALM approaches

- Focus on the integrated asset liability management

- Integration of advanced ALM methods into the Solvency control and limit system
Dynamic limit setting in the investment management process

• Model assumptions
  – Assets solely consisting of bonds
  – Focus downgrade/default risk
  – Technical provisions constant
  – Pre-defined impacts of downgrades on SCR / Fair Values

• Calculation steps
  – Estimation of transition probabilities for a quarterly timeline
  – Simulation of downgrades based on calculated probabilities
  – Re-calculation of portfolio fair value and SCR
  – Worst case scenario
Dynamic limit setting in the investment management process

Assets covering technical provisions, MCR and SCR

Downgrade

\[
\begin{align*}
\{ & \text{SCR}_1 \\
& \text{SCR}_0 \} \\
\{ & \text{ASM}_0 \\
& \text{ASM}_1 \} \\
\end{align*}
\]
Summary

• Solvency control
  – Simultaneous controlling of the impact of investment risks on SCR and ASM necessary
  – Top-down structuring of risk controlling approaches with focus on the company’s overall financial constitution
  – Lessons learned from the financial crisis: Consideration of risk model limitations

• Risk limit system
  – So far no specific requirements regarding risk limit systems included into the Solvency II Framework Directive
  – But specific requirements in individual countries (German Minimum Requirements on Solvency Control)

• Challenges
  – Link between individual investment limits and overall solvency control
  – Consideration of investment risk dynamics
  – Integration of ALM requirements
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Breakout Session Topic 10: Solvency, guarantees and risk capital
Lunch Break