COMPLEX ACCUMULATION RISKS – A CHALLENGE FOR THE INSURANCE INDUSTRY

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Accumulation risks are growing in complexity

Complexity of the risks

- SEVERE BODILY INJURY
- CONTINGENT BUSINESS INTERRUPTION LOSSES
- NATURAL CATASTROPHES
- LONGEVITY
- TERRORISM
- EARTHQUAKES
- WINDSTORMS
- DROUGHT

Time
Insured market catastrophe loss potential
(Scenarios)

EQ California: US$ 80bn
Hurricane USA: US$ 150bn
Windstorm Europe: US$ 40bn
EQ Japan: US$ 100bn

Earthquake hazard
low    high

Tropical cyclone hazard
low    high
Increased interconnectedness leads to increasing complexity of risks

New insurance solutions are needed in a changed risk landscape

Source: WEF, Global Risks 2011, Jan. 2011
The prerequisites for insurability remain unchanged even for new kinds of risks

Risks are only insurable if...

... the potential losses are measurable

... losses occur randomly

... the (re)insurer has a large number of the same type of risk in its portfolio

... they are independent of other risks

Risk independence is vital – this is how insurers avoid becoming systemically relevant

Global trends increase the complexity and interdependency of risks
Challenges:

- Changing risks over time due to political/social developments and the organisational capabilities of terrorist organisations
- No reliable frequency estimation (copycats, concerted actions)
- Conventional terrorism covered (pools, public private partnerships)
- Losses from attacks using chemical, biological or radioactive substances exceed the financial capacity of insurance → exclusion
Accumulation risks II – Dealing with contingent business interruption (CBI)

Challenges:
- Constantly changing economic relations create unknown risks
- Only limited CBI loss statistic available
- Uncontrollable nat cat exposure
- Insurers of CBI risks are covering a risk they can hardly quantify
- The reinsurer has the risk of accumulation from a variety of participations with different insurers from all over the world
Two systemic risk scenarios influence the severe bodily injury risk:

<table>
<thead>
<tr>
<th>Long-latency diseases</th>
<th>Risk of change</th>
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<tbody>
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<td>e.g. asbestosis</td>
<td>e.g. claims inflation, legal changes</td>
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The major focus is aimed at an increased alignment of interest between insurer and reinsurer.

**Measures:**
- Early identification of risk trends
- Adoption of the risk-sharing clause, i.e. one person is one event for the purpose of reinsurance

**Measures:**
- Detailed analysis of claims inflation
- Adequate consideration of inflation drivers in the pricing
- Application of indices for stabilisation clauses representing the actual claims inflation
- Replicating asset portfolio
Challenges:

- Life expectancy is increasing worldwide
- Historically, improvements in mortality have always been underestimated
- The longevity trend cannot be geographically diversified
- This is not a random development

*Source: http://www.un.org/esa/population
Munich Re has been developing a software tool for qualitative and quantitative analysis of complex accumulations of risks. The tool is called Complex Accumulation Risk Explorer (CARE) and is currently in a trial version.

The target is the systematic identification of complex loss scenarios using interdisciplinary expert knowledge.

The diagram shows the top level structure with four main categories: Society & Politics, Environment & Nature, Economy, and Technology. These categories interact with each other to form complex accumulation risks.

Target is the systematic identification of complex loss scenarios using interdisciplinary expert knowledge.
Example: Potential consequences of a prolonged heat and drought period (selected nodes)

CARE supports a structured discussion of accumulation scenarios
Complex risks require improvements to traditionally successful risk-management tools

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<td>This complexity will have implications on diversification benefits</td>
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<td>Transparency is a necessary condition for managing complex risks</td>
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<td>Managing complex risks is a new challenge for the industry and requires a long-term commitment and active dialogue with external organisations</td>
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<td>CARE will support identifying and structuring complex accumulation risks</td>
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