Enterprise Risk Management in (Re)Insurance

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## **Topics of Discussion**

- Enterprise Risk Management
- Risk management structure and tasks in a global insurance company
- Emerging risks and their importance for a Reinsurer
- "A model is a model is a model!"
- The future of risk management?

#### Enterprise Risk Management

# Requirements of Risk management are expanding – internally as well as externally







2008 – 2009 Financial crisis made clear risk management needs strengthening Development of holistic approach  $\rightarrow$  Enterprise Risk Management

ERM requires strict separation of roles and responsibilities



## **Board of Management**

- Approves business strategy
- · Sets risk appetite and expected risk-adjusted returns
- Resource and capital allocation

# Business Management / Risk OwnersIndependent• Business Planning• Clear mandate by the

- Identify and evaluate risks
- Take steps to manage / mitigate all risks associated with their business
- Manage and own risks of all approved transactions regardless of ultimate approval level

# Independent Risk Management

- Clear mandate by the Board to ensure that for all classes of risk appropriate limits, policies, procedures and measures are in place within each Business Unit
- Aggregate and monitor group-wide risks (e.g. risk capital) and report to Board
- Develop risk mitigation strategies
- · Act as a risk consultant to Business Units

# **Internal Audit**

Audit function independently verifies that effective controls are in place and functioning properly

#### Structure of Risk management

## Integrated Risk Management – Structure follows process



### Risk Identification & Control

- Risk assessment / risk reporting
- Risk disclosure
- Emerging risks management
- Operational risk management
- Accumulation control

# Risk Analytics & Reporting

- Development and maintenance of risk models
- Legal entity models
- Risk capital calculations
- Allocation of risk capital for VBM purposes
- Scenario calibration

Risk Strategy / Asset & Liability Management

- Strategic Risk Management Framework
- Strategic ALM
- Limits and Triggers System
- Risk Management Governance
- Risk reviews and new product approval

#### **Business Enabler**

- Identify and support new business opportunities
- Enable operational units to display the additional value of reinsurance
- Strengthen client relationship through advice and service

- Structure aligned with risk management process
- Business liaison roles designed to "embed" risk management tools and processes in our daily business
- IRM reports to the Group CRO, i.e. is independent from the risk taking process

#### The value of Risk Management

# Munich Re Example: Cost of capital substantially reduced



#### **Investment risks**

- Lowered equity gearing
- Reduced concentration risks
  - Moderate credit risk

#### Asset-liability management

- State-of-the-art ALM
- Strong risk management

#### **Insurance risks**

- Active cycle management
  - High diversification
- Strong Group reserves



<sup>1</sup> 5-year CDS. Peers: Allianz, AXA, Berkshire, Generali, Hannover Re, ING, SCOR, Swiss Re, Zurich Insurance. Source: Bloomberg



# Risk Identification – Emerging Risk Management Accumulation Control



Emerging Risks What are Emerging Risks?



"Definition"

Emerging risks comprise new and developing risks and their related business opportunities for the insurance industry.

They result from changes in risk factors
with a high degree of uncertainty both in terms of occurrence probability and loss amounts, and
with a substantial potential impact on the company's risk profile.

## **Key Characteristics**

- Driven by environmental, technological, social, economic or legal changes
- Link between cause and effect not proven
- Catastrophe potential across insurance lines and balance sheet
- Difficult to quantify (frequency / severity)
- Often long-term exposure



**Emerging Risks** 

Münchener Rück

#### **Emerging Risks**

# World Economic Forum identified "Core Global Risks" most have direct impact for the insurance industry





#### ECONOMIC

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- Food price volatility
- Oil and gas price spike
- З Maior fall in US\$
- Slowing Chinese economy (6%) 4 5
  - Fiscal crises
  - Asset price collapse
- 7 Retrenchment from globalization (developed)
- Retrenchment from globalization (emerging) 8
- Regulation cost 9
- 10 Underinvestment in infrastructure

#### GEOPOLITICAL

- 11 International terrorism
- 12 Collapse of NPT
- US/Iran conflict 13
- US/DPRK conflict 14
- 15 Afghanistan instability
- 16 Transnational crime and corruption
- 17 Israel-Palestine conflict
- 18 Violence in Iraq
- 19 Global governance gaps

#### **ENVIRONMENTAL**

- 20 Extreme climate change related weather
- 21 Droughts and desertification
- 22 Loss of freshwater
- NatCat: Cyclone 23
- 24 NatCat: Earthquake 25
- NatCat: Inland flooding 26 NatCat: Coastal flooding
- 27 Air pollution
- 28 Biodiversity loss

#### SOCIETAL

- 29 Pandemic
- 30 Infectious disease
- 31 Chronic disease
- 32 Liability regimes
- 33 Migration

#### **TECHNOLOGICAL**

- 34 CII breakdown
- 35 Emergence of nanotechnology risks
- 36 Data fraud/loss

Source: World Economic Forum, "Global Risk Report 2009", January 2009

#### Example

# Asbestos – From occupational disease to product liability





The earliest reported death due to an as bestos-related disease occurred in London in 1900 in a man whose as bestos-exposure occurred over a 12-year period. Murray, H.M. (1907): Report of the Committee on Compensation for Industrial Diseases. Minutes of Evidence, CD3946 Her Majesty's Stationary Office. London, UK

#### **Emerging Risks**

# Scenario planning and analysis as fundamental risk management tool





Systematic approach to manage the "unknown Unknowns"

#### Example

# Shell – Prepared for the Oil Crisis



### Beginning of 1970's

- Shell planning group focusing on factors/events influencing the oil price
- Strategy development taking into account potential wild card ...
  - Core strategy based on assumption of continuation of past oil price movements
  - Alternative strategy based on "wild card" significant oil price increase due to supply limitation
- Being prepared for wild card definition of …
  - Required precautionary measures
  - Respective strategic options and operative actions

### 1973 oil crisis



- Oil price quadrupled due to limited supply following Yom Kippur war
- Shell able to significantly strengthen market position within crisis due to fast implementation of measures predefined in scenarios

Source: Munich Re, Corporate Development; Shell



9/11 triggered initial cross-line and cross-segment considerations of catastrophic losses  $\rightarrow$  Katrina turned them into a prerequisite.

#### Accumulation control





## Management Approach

#### Past:

- Classic scenario analysis considered individual scenarios and accumulation risks independently from each other.
- Complex accumulation risks feature conditional dependencies, e.g. supply chain business interruption or pandemic accumulation risk
- Management requires a different approach:

### Present / Future:

- Identification of dependencies within a holistic approach to cover all possible and relevant accumulation risks and its connections.
- Recognition and quantification of tail dependencies in risk model (e.g. copula).
- Allocation of risk capital to Lines of Business and therefore risk adjusted pricing.
- Definition of measures to mitigate so far unforeseen accumulation risks



#### Example









Risk Analytics & Risk Strategy – Capital Models and Strategic Risk Management Framework



#### **Capital Models**

Risk measurement is usually done in an economic framework



## **Valuation Principles**

Under an economic view, the following valuation principles prevail – still:

- Assets are valued at their observable market values.
- Liabilities are valued with techniques that are consistent with financial valuation principles, i.e. options and guarantees in primary life business are valued with riskneutral valuation techniques, for example.





Although risk can be measured in any accounting framework, for internal management purposes the economic view prevails.



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#### **Capital Models**

## Putting everything together





The individual risks are aggregated incorporating their nonlinear dependency structure represented by a rank correlation matrix and coefficients of upper tail dependency.

#### **Capital Models**



# Risk modeling – Standard process with strong links to relevant parties

## Risk capital reporting

- Quarterly assessment of Economic Risk Capital (ERC)
- Relevant bodies (e.g. risk committee) discuss quarterly capital reports
- ERC strongly embedded in key management processes, e.g.
  - Strategic Risk Management Framework (ALM, Insurance Risk steering, risk mitigation)
  - Capital allocation and pricing
  - Performance measurement
  - Embedded in annual planning process
- Consistent with principles of Solvency II
- Annual disclosure



Risk modeling is a routine process that is embedded in relevant management applications

## Scenario analysis Stress-testing revealed impacts by segment and line of business



Sensitivity of premium volume and claims varies by line of business



Stra	Strategic Risk Management Framework				
O b			Munchener Ruck Munich Re Group		
j					
e c t	S	RMF complements business strateg	У		
İ		A rigorous framework designed to			
v e s	enable Munich Re Group to protect and generate sustainable shareholder value	ensure highest degree of confidence in meeting policyholders' claims	protect reputation of Munich Re Group		
f S	Deeply rooted in economic steering concepts				
t r a	"Flexible" enough to reflect other constraints				
e e					
	Genera	te shareholder value while prote	ecting policyholder		

Strategic Risk Managen P O	Münchener R Munich Re Gi	ück roup	
r t f	Criterion	Constituency focus	
Whole	Financial strength	Policyholders	
criteria	Avoiding financial distress	Shareholders	
r			
i t Supple-	Peak risk management at Group and/or sub-Group level: concentration limits, maximum per-risk retention	Shareholders (mainly)	
r <sup>criteria</sup> i	A-L mismatch	Shareholders	
а			
a n d			



All criteria comfortably met

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#### Purpose

Manage probability of becoming financially distressed

#### Definition

- Economic Earnings represent creation of Available Financial Resources over a period in time, gross of capital management activities<sup>1</sup>
- Expected Economic Earnings derived from planned IFRS earnings

#### Economic Earnings-at-Risk

- Derived from economic capital model
- Limit applies at Group level
- Financial distress limit almost fully utilised

## Earnings-at-risk criterion developed to protect franchise value

Strategic Risk Management Framework
O Münchener Rück Munich Re Group
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<b>e</b> Purpose
<ul> <li>Limit the probable maximum loss from any one systematic risk type</li> </ul>
<ul> <li>Ensure that we do not overconcentrate on any one risk type, even if whole portfolio risk criteria are</li> <li>satisfied (enforced diversification)</li> </ul>
U Reduce model risk / risk of change
P Strategy
Description: Provide a series of the seri
<ul> <li>We do not "overhedge" expected digestable short-term event volatility</li> </ul>
Keeps profits in-house
Minimises reliance on external protection
nRisk limits (examples)
t   NatCat (per scenario)
a Terrorism (portfolio)
r ■ Pandemic (scenario)
y ■ Individual risk accumulations (life, non-life)
<ul> <li>Limits reviewed at least annually relative to business opportunities (cycle management)</li> </ul>

# Supplementary risk criteria in place for material systematic risks

# Quo vadis, risk management?





# Changes & Challenges



Markets and Environment	<ul> <li>Bailouts might lead to the perception that governments will support struggling institutions and to an erosion of risk culture</li> <li>Insurers without government support might be at a competitive disadvantage</li> <li>Likely key changes in the market for the next few years</li> <li>Global recession impacting profits and growth prospects</li> <li>Low interest rate environment</li> <li>High risk aversion by investors and higher capital costs</li> </ul>
	<ul> <li>Rating sensitive policyholders</li> </ul>
	<ul> <li>Possible fundamental shift in the stock market to a long duration bear market and high volatility</li> </ul>
	<ul> <li>Implementation of new capital rules (e.g. Solvency II)</li> </ul>
	<ul> <li>Implementation of IFRS phase II</li> </ul>
	<ul> <li>Organisations will increasingly see risk management as adding value to the firm and being an investment into the future</li> </ul>
	<ul> <li>Combine profit maximisation with loss potential minimisation</li> </ul>
Impact	Focus on capitalisation, not so much RoE or RoRAC
for	<ul> <li>Question validity and scope of historical calibration</li> </ul>
Risk Management	<ul> <li>Defending principles: economic, risk based principles, for management and valuation for assets and liabilities: mark-to-market if markets exist, if not use mark-to-model</li> <li>Avoid watering down existing/planned regulatory framework</li> </ul>



Imagine

"If you always think the way you always thought, you'll always get what you've always got."



- New business initiatives with clear strategy and consideration of impact on supporting units
- Business case and plan based on realistic assumptions and with regular challenge
- Silo mentality vs. cross-disciplinary communication and discussion  $\rightarrow$  Company wide Risk Management Family!

Scenario planning and analysis of complexities as fundamental risk management tools



#### Analyse

# Know and monitor your relevant risks



Highly sophisticated models in place



- "All models are wrong! But some are useful."
- Reliances and Limitations openly addressed and clearly communicated
- Fundamental analysis of underlying risks
- In-house valuation instead of heavy (exclusive?) reliance on external parties, e.g. agency ratings
- Comprehensive limit system: we surely have enough limits, but do we have the right ones?
- Have measures in place to deal with model risk,
   e.g. nominal budgets, stress tests



Pay heed to Early Warning Signals: Act before you have to!





Alignment of risk management functions with incentives

Minimum Action Requirements

- Risk management needs to be independent from business units
- Risk management is beyond a remote principle & policy unit
- Risk management needs teeth, i.e. sufficient authority

# "A model is a model is a model is a model..."









Models cannot take any decisions – but they can be extremely useful in arriving at a decision



# Humans rely on mental shortcuts (heuristics) for decision-making in complex situations

Type of Heuristic	Tendency to believe that behaviour is correct to the extent that	Examples from the financial industry
Social Proof	other people are engaged in it	<ul> <li>Peer pressure (RoE)</li> <li>"As long as the music plays, you ought to dance"</li> <li>Ambitious targets and limited risk appetite fuelled the structured product market</li> </ul>
Commitment	it is consistent with some prior commit- ment we made	<ul> <li>Stick to strategy despite obvious warning signs, in particular from third parties</li> <li>Perception and believes</li> <li>"Risky shift": keep growing portfolio</li> </ul>
Familiarity	we have done it before	<ul> <li>Rating based analysis:</li> <li>Ok for Corporate bonds</li> <li>Not ok for structured products</li> <li>Standard portfolio theory:</li> <li>Ok for plain counterparty risk</li> <li>Not ok for systemic risk products</li> </ul>

Inappropriate application of mental shortcuts leads into the heuristic trap!

The Human Factor in Risk Management

# Humans are a social species after all – The danger of Groupthink in Committees

"A mode of thinking that people engage in when they are deeply involved in a cohesive ingroup, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action" Irving Janis (1972) "Victims of Groupthink"

## Reasons

## Structural faults in the organisation

- Insulation of the Group
- Lack of tradition of impartial leadership
- Lack of norms requiring methodological procedures
- Homogeneity of members' social background and ideology

## Provocative situational context

- High stress from external threats
- Recent failures
- Excessive difficulties on the decision-making task
- Moral dilemmas

## Symptoms

- Illusions of invulnerability
- Rationalising warnings
- Unquestioned belief
- Stereotyping
- Direct pressure
- Self censorship
- Illusions of unanimity
- Mindguards





The Human Factor in Risk Management



# How can we deal with the Human Factor?

Mitigation measures	Examples	
Experience	<ul> <li>"Good decisions come from experience, and experience comes from bad decisions" (Bruce Tremper)</li> </ul>	
Interdisciplinary teams	<ul> <li>Beware of Quants!</li> <li>Need to understand human behaviour</li> <li>Historians, social scientists</li> </ul>	
Compensation	<ul> <li>"Money is better than poverty, if only for financial reasons" (Woody Allen)</li> <li>Based on limitation of losses</li> </ul>	
Communication	<ul> <li>Need to talk openly to business units and senior management</li> <li>Understand language and culture</li> </ul>	
Courage	<ul> <li>make judgment calls</li> <li>question assumptions by traders and product developers</li> </ul>	
Risk Culture	<ul> <li>Embrace open discussions</li> <li>Error tolerance</li> <li>Risk management needs gamblers, who risk their own money</li> </ul>	
Outside experts	<ul> <li>Devil's advocate</li> </ul>	
Awareness	<ul> <li>Beware of the situation</li> <li>Mind the heuristic traps</li> <li>Challenge your believes: "How might I be wrong here?"</li> </ul>	

# The perfect solution?





"We've considered every potential risk except the risk of avoiding all risks!"

# Thank you very much!

