A dip into newer P&C opportunities

Jürgen Gräber, Member of the Executive Board
Hannover Re successfully exploits market opportunities ...
... and implements growth initiatives without neglecting cycle management

P&C reinsurance net premium earned in m. EUR

- Improved diversification and reduced NatCat exposure leading to lower earnings volatility
- Cycle management combined with selective underwriting
- Past and future growth opportunities from global trends
- Increase in 2015 driven by one-offs

* Based on previous segment reporting
Agenda

02 – 11 | Cyber insurance
12 – 22 | Agricultural insurance
23 – 23 | Conclusion
Technological trends
Drivers of the cyber insurance market

A clear trend: always on & (hyper-) connectivity
Cyber insurance - risks and coverage

### Types of risks

<table>
<thead>
<tr>
<th>Data breach</th>
<th>Hacker attacks</th>
<th>Malicious attacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business interruption</td>
<td>Privacy breach</td>
<td>Liability</td>
</tr>
<tr>
<td>Trojan attacks</td>
<td>Viruses</td>
<td>Data loss</td>
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</tbody>
</table>

### Who is affected?

Everybody!

### What types of cyber insurance are there?

**First party (own losses)**
- Data and system recovery
- Network interruption
- Cyber breach remediation & notification expenses
- Cyber extortion

**Third party (losses caused to third parties)**
- Privacy protection liability
- Network security liability
- Media liability
Cyber insurance
Standard coverage - first party

▶ Data & system recovery
  • Covers costs to re-secure, replace, restore or recollect data, applications or systems which have been corrupted or destroyed

▶ Network interruption
  • Covers loss of income and associated extra expense arising out of the interruption of business due to a network security breach (internal, external [DDoS, active hacking, malware])

▶ Cyber breach remediation and notification expenses
  • Notification cost
  • Emergency hotline or call centre expenses
  • IT forensics expenses
  • Identity theft and credit monitoring expenses
  • Public relations cost
  • Legal defence cost

▶ Cyber extortion
  • Covers extortion payments and associated expenses arising out of a cybercriminal threat to release, encrypt, destroy sensitive information or interrupt the company’s network unless consideration is paid
Cyber insurance
Standard coverage - third party

► Privacy protection liability
  • Protection from losses arising out of the failure to protect sensitive personal or corporate information, i.e. breach of privacy and security obligations under federal, state, local or foreign statutes, rules or regulations

► Network security liability
  • Covers liability arising out of the failure to protect your network, i.e. unauthorised access or unauthorised use (internal & external) of your systems, or inability of access e.g. due to a (distributed) denial of service attack or transmission of malware

► Media liability
  • Protection against claims arising out of the releasing, gathering and the communication of confidential information
  • Coverage against copyright or trademark infringement, violation of privacy, libel, slander, plagiarism or negligence arising out of various ways of electronic publishing, transmission and distribution of internet content
## Gaps in the coverage of traditional insurance classes

<table>
<thead>
<tr>
<th>Policy trigger:</th>
<th>Property</th>
<th>BI</th>
<th>General liability</th>
<th>Crime</th>
<th>D&amp;O</th>
<th>Cyber cover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical Damage</td>
<td>Physical Damage</td>
<td>Actual fault</td>
<td>Criminal Act</td>
<td>Breach of duty</td>
<td>Loss of data/network failure</td>
</tr>
<tr>
<td>Direct and indirect financial loss</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Hacking</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Data theft</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Privacy liability</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>BI following a DDoS/Hacking</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Reconstruction of network, data, software…</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Liability following physical loss of data</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Contractual liability towards PCI</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Costs following loss of data</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Costs following a data security breach</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Costs for external security specialists</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Costs for legal advice</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Public relation expenses</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Extortion money</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
</tbody>
</table>
Public starts taking notice

Ashley Madison hack highlights cyber extortion risks
Business Insurance, By Donna Mahoney, 1 September 2015

Millions of Anthem Customers Targeted in Cyberattack
The New York Times, By Reed Abelson and Matthew Goldstein, 5 February 2015

Hacking Experts Call Sony Cyber Attack
‘Unparalleled And Well Planned Crime’
Business Insider UK, By Lisa Richwine and Jim Finkle, Reuters, 7 December 2014

Home Depot's 56 Million Card Breach Bigger Than Target's
'True, Custom-Built Malware' Eliminated From Retailer's Systems After Five-Month Attack on Terminals
THE WALL STREET JOURNAL, By Robin Sidel, Updated: 18 September 2014

Cyberattack that hit Target a widespread threat to consumers
"...More than 1,000 US businesses have been affected by the cyberattack that hit the in-store cash register systems at Target, Supervalu, and most recently UPS Stores…”
The Boston Globe, By Nicole Perlroth, New York Times, 23 August 2014

Exclusive: EBay initially believed user data safe after cyberattack
REUTERS, By Jim Finkle and Deepa Seetharaman, 23 May 2014

2014: THE YEAR IN CYBERATTACKS
Newsweek, By Sharone Tobias, 31 December 2014

Cyber insurance
Loss potentials
Cyber attacks lead to annual losses for global economy > USD 400 bn.*

- HIPAA/HITECH Act:
  - USD 1.5 m. per breach; often more than one breach in case of data leakage
  - Payment Card Industry (PCI): up to USD 200,000 per month
- Unpredictable amount of penalties

- Notification: USD 0.5 to USD 5 for each notification per victim
- Identity theft and credit monitoring: USD 10 to USD 30 annually per victim
- Defence cost: on average USD 500,000
- Lost income: up to 5% of clients leave Financial Institution following a data breach

- Class action suits from individuals: average settlement payment ~ USD 1 m.
  target settlement USD 10 m.

* McAfee, Estimating the Global Cost of Cybercrime, June 2014
HIPAA = Health Insurance Portability and Accountability Act of 1996
HITECH = Health Information Technology for Economic and Clinical Health
## Development of cyber insurance market in the US and Europe

### US

<table>
<thead>
<tr>
<th>Regulatory activities</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Pioneer in cyber security</td>
<td>▶ Estimated GWP in 2014 ~USD 1.5 bn. gross</td>
</tr>
<tr>
<td>▶ Since 2003, increased regulatory activities in relation to data protection and cyber security</td>
<td>▶ Expected growth rate: ~38%</td>
</tr>
<tr>
<td></td>
<td>▶ Penetration rate: ~34%</td>
</tr>
</tbody>
</table>

### Europe

<table>
<thead>
<tr>
<th>Regulatory activities</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ First EU data protection guideline (Data Privacy Protection Directive) in 1995</td>
<td>▶ Estimated GWP by 2018: ~USD 900 m.</td>
</tr>
<tr>
<td>▶ In 2013, tightening of directive due to inconsistent laws in EU, stricter notification rules and penalties</td>
<td>▶ Expected growth rate: ~50%</td>
</tr>
<tr>
<td>▶ Implementation of new EU directive, most likely in 2016</td>
<td>▶ Penetration rate: ~2%</td>
</tr>
</tbody>
</table>

### Rest of World (RoW): increasing awareness creating new demand

1) AON, Insurance Risk Study 2014
2) Der Cyber-Versicherungsmarkt in Deutschland, 2014, Springer Verlag, Marsh UK Cyber Security 2015
US is pioneer in cyber security but still has a way to go - strong growth potential

Most European companies do not buy cyber insurance yet - very strong growth potential
  - Implementation of a new EU directive in 2016?

Rest of World offer stronger growth potential

Available capacity (still) exceeds demand (single risk/limit)

Continual development of attacks

Premium adequacy not proven yet

Hannover Re sees more opportunities than risks in cyber business
HR's approach to realise cyber business opportunities
Establish ourselves as a skilful and preferred business partner in cyber reinsurance

Use a uniform strategy group-wide

Develop underwriting guidelines with clear “dos and don’ts”

Specify and model possible Realistic Disaster Scenarios

Enhance and fine-tune pricing tools

Focus on risk quality and a professional handling of exposure

Define target markets

Develop cyber R/I cover
Agenda

02 – 11  |  Cyber insurance
12 – 22  |  Agricultural insurance
23 – 23  |  Conclusion
Growing population and food demand with less arable land ...  
... make agriculture a constant challenge

### Types of risks

<table>
<thead>
<tr>
<th>Risk</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost</td>
<td>Cold temperatures, ice, frost damage on crops and livestock</td>
</tr>
<tr>
<td>Drought</td>
<td>Long periods of dry weather, insufficient water for crops</td>
</tr>
<tr>
<td>Heavy rainfalls</td>
<td>Excessive precipitation, flooded crops and fields</td>
</tr>
<tr>
<td>Heat</td>
<td>High temperatures, heat stress on crops and livestock</td>
</tr>
<tr>
<td>Sickness</td>
<td>Illness or disease in livestock, livestock death</td>
</tr>
<tr>
<td>Disease</td>
<td>Infection or disease spreading among crops and livestock</td>
</tr>
<tr>
<td>Pests</td>
<td>Insects, rodents, other pests affecting crops and livestock</td>
</tr>
<tr>
<td>Equipment</td>
<td>Damage to farm equipment, machinery, and infrastructure</td>
</tr>
<tr>
<td>Pricing</td>
<td>Financial losses due to market fluctuations</td>
</tr>
<tr>
<td>Wind</td>
<td>Gusts, storms, and other wind-related damages to crops and livestock</td>
</tr>
<tr>
<td>Viruses</td>
<td>Infectious diseases spread by viruses, affecting crops and livestock</td>
</tr>
</tbody>
</table>

### Who is affected?

- Governments
- Farmers
- Everybody!

### What types of agricultural insurance are there?

- **Single-risk insurance**
  - One peril or risk (e.g. hail)

- **Named (peril) insurance**
  - Two or more risks, mostly with hail as basic

- **Farm package insurance**
  - A combination of guarantees for crops and farm infrastructure

- **Multiple Peril Crop Insurance (MPCI)**
  - Losses from natural causes (e.g. wind, drought, frost, rain, pests, disease, etc.)

- **Revenue Insurance Plans (e.g. Crop Revenue Coverage (CRC), Income Protection (IP), etc.)**

- **Index insurance (e.g. weather, yield, NDVI (Normalized Differenced Vegetation Index), etc.)**
Our global food supply is faced with enormous challenges
By 2050, 9 bn. people require 70% - 80% more food (>1000 calories per day/person)

Envisioned development of future demand vs. land

Arable land
(~ 1.5 bn. ha = ~ size of Russia)

Food, Fuel, Feed, Forest, & Fiber demand
Demand for food will grow by ~40%

Population growth:
Expected annual growth of ~ 1%
(~ 8.4 bn. in 2030 vs. ~ 7.3 bn. today)

Risk transfer is necessary to protect the capital investment in agriculture
Agricultural business - a global megatrend
As world population & income rise, the race is on to meet changing nutritional needs

1. Global population is growing by 210,000 people every day
   - Strongest population growth in Asia
   - People increasingly live in urban centres
   - Life expectancy is increasing

2. High economic growth is bringing large part of population out of poverty (Mexico, Brazil, China, India, etc.)
   - What is more, the food consumption pattern is changing increasing the consumption of meat and healthy, high quality food (organic)

3. The natural resources are limited
   - Land and water scarcity
   - Changing weather and increasing pollution

4. There is a need and a trend to invest in, diversify and intensify agriculture
   - Capital is moving into the agricultural sector in emerging markets
   - Technical modernisation requires considerable investment
   - Countries worldwide are interested in gaining food self-sufficiency

In 1985, meat consumption in China was 20 kg per person per year. By 2000, it had increased to 50 kg. Further increases are projected.

On the supply side, environmental pressures and increasing urbanisation are putting further strain on already limited resources.
High growth potential of insurance premium in...
...emerging markets from USD 3.9 bn. (2009) up to USD 15 - 20 bn. (2025)

Agriculture insurance premium vs GDP

Source: Worldbank, 2009
Sigma, 2012
Insurance penetration in agricultural crop business
Still huge growth potential

Ratio of insured vs. cultivated areas

<table>
<thead>
<tr>
<th>Country</th>
<th>Cultivated areas</th>
<th>Insured areas</th>
<th>Growth potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>167</td>
<td>88%</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>165</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>160</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>167</td>
<td>17%</td>
<td></td>
</tr>
</tbody>
</table>

Source: own data
Our key markets with growth potential - US and China
Primary market gross written premium

**USA**
1) United States Department of Agriculture (USDA)

- **CAGR +10.9%**
- Major market for revenue cover worldwide, where price and yield variability are compensated
- Key market for HR due to strong support by the state on premium and loss caps, technically sound terms and modelling tools
- Medium-term stable outlook for the market

**China**
2) CIRC

- **CAGR +54.7%**
- Since 2007, China has become the fastest growing agricultural insurance market
- Medium-term outlook: further growing market

---

1) United States Department of Agriculture (USDA)  
2) CIRC
High growth potential in India and Latin America

Primary market gross written premium

**India**
- CAGR +28.1%
- Depends strongly on state support and strategy
- Medium-term outlook: potentially high growing market

**Latin America**
- CAGR +23.3%
- Low penetration rate and highly dependent on state support (PPP)
- Medium-term outlook: high growth potential

Source: own data
Most important agricultural insurance markets
* Our key markets

Agricultural area >25 m. ha
- Ukraine
- Argentina
- Turkey
- Nigeria
- USA *
- Russia
- Brazil *
- China *
- India *
- Mexico *
- Australia
- Canada
- UK
- France
- Germany
- South Korea
- Spain
- Italy

Population >100 m. people
- Pakistan
- Bangladesh
- Philippines
- Japan
- Indonesia

GDP USD >1 trillion

Own data
A steady increase in agricultural premium ...
... with further growth potential

Hannover Re’s GWP development of agriculture

in m. EUR

CAGR
+26.1%

2014:
- Australia & NZ 2%
- Africa 3%
- South America 32%
- Europe 19%
- Asia 17%
- North America 27%
Our agricultural portfolio is well diversified
Based on gross premium written in 2014

By line of business

<table>
<thead>
<tr>
<th>Line of Business</th>
<th>2014: EUR 287 m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry</td>
<td></td>
</tr>
<tr>
<td>- E.g. Fire and wind</td>
<td></td>
</tr>
<tr>
<td>Livestock, bloodstock &amp; Aquaculture</td>
<td></td>
</tr>
<tr>
<td>- E.g. Fire, severe cold and epizootics (animal diseases)</td>
<td></td>
</tr>
<tr>
<td>Hail</td>
<td></td>
</tr>
<tr>
<td>- Oldest form of insurance in agriculture (oldest policies in Germany were placed in 1820)</td>
<td></td>
</tr>
<tr>
<td>Multi-peril crop</td>
<td></td>
</tr>
<tr>
<td>- Systematic risks</td>
<td></td>
</tr>
<tr>
<td>- Frost (Mexico 2010, Poland 2011)</td>
<td></td>
</tr>
<tr>
<td>- Drought (USA 2012)</td>
<td></td>
</tr>
</tbody>
</table>

~ 10% of premium is microinsurance
Our approach for future agricultural business development

- Highly dedicated international team of specialists (agronomists & veterinarians) drawing on backgrounds of R/I, international development assistance, agricultural and veterinarian engineering, economics, science, and can serve in a number of native languages

- Close cooperation with strategic partners (e.g. governments, world banks, non-governmental organisations, etc.)

- Continuous and systematic screening of opportunities (e.g. aquaculture, forest, etc.)

- Committed to fostering and developing microinsurance (e.g. Climate Insurance Fund)

- Innovation is a key contributor to our growth (e.g. satellite)
Agenda

02 – 11  |  Cyber insurance
12 – 22  |  Agricultural insurance
23 – 23  |  Conclusion
Conclusion ... there is more than just NatCat

- Growth is safeguarded by expert knowledge
- Specialty lines and products do support growth that is embedded in more traditional segments
- There are lines of business with significant entry barriers
- Evolution of products and innovation continues
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