Monte Carlo 2017
Fit for a game change

Monte Carlo, 10 September 2017
Torsten Jeworrek, Thomas Blunck
1. Munich Re strategy  
   Torsten Jeworrek

2. Global reinsurance landscape  
   Torsten Jeworrek

3. Insurance gap  
   Flood insurance  
   New solutions for governments  
   Torsten Jeworrek

4. Financially motivated solutions  
   Thomas Blunck

5. Expanding the boundaries of insurability  
   New coverages  
   Thomas Blunck
Fit for a game change

1 Munich Re strategy

Monte Carlo - Media conference, 10 September 2017
Moderate reinsurance premium growth expected until 2019, slightly stronger growth in primary insurance

Global premium development from 2010–2016/2017e–2019e

P-C RI: Ceded premiums 2016 €bn

<table>
<thead>
<tr>
<th>Region</th>
<th>Ceded Premiums (€bn)</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>€72bn</td>
<td>33%</td>
</tr>
<tr>
<td>North America</td>
<td>€70bn</td>
<td>31%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>€54bn</td>
<td>24%</td>
</tr>
<tr>
<td>Latin America</td>
<td>€14bn</td>
<td>7%</td>
</tr>
<tr>
<td>Africa/Middle East</td>
<td>€11bn</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>~€222bn (100%)</td>
<td></td>
</tr>
</tbody>
</table>

P-C RI and PI real growth rates (CAGR)

<table>
<thead>
<tr>
<th>Region</th>
<th>10–16</th>
<th>17–19</th>
<th>10–16</th>
<th>17–19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>North America</td>
<td>3%</td>
<td>0.5%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>5%</td>
<td>2%</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Latin America</td>
<td>5%</td>
<td>3%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Africa/Middle East</td>
<td>2%</td>
<td>4%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: Munich Re Economic Research

Monte Carlo - Media conference, 10 September 2017
Traditional reinsurance capital stable overall

ART outstanding covers growing

<table>
<thead>
<tr>
<th>Dedicated reinsurance capital US$ bn</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traditional RI capital</strong></td>
</tr>
<tr>
<td>2012: 300</td>
</tr>
<tr>
<td>2013: 310</td>
</tr>
<tr>
<td>2014: 320</td>
</tr>
<tr>
<td>2015: 330</td>
</tr>
<tr>
<td>2016: 340</td>
</tr>
</tbody>
</table>

**Trends**

**Traditional capacity**
- Capital base of the reinsurance industry stable overall over the last 3 years
- Many reinsurers use dividend payments and share buy-backs to manage their capital more actively

**ART**

**Existing tradeable instruments (ILS/ILW)**
- Record issuance of ~US$ 9bn in H1/2017, including renewals and new sponsors
- First move towards non-standard solutions in the ILS area with the Pandemic Emergency Facility by World Bank

**Illiquid structures**
- Illiquid, (partially) collateralised ART structures (collateralised reinsurance, sidecars and retro) represent ~70% of the market
- Munich Re with established sidecar programme well positioned to utilise this market

Source: AM Best, Guy Carpenter, Aon Benfield, Munich Re
Global threats call for new insurance coverage to mitigate risk potentials

- Exchange-rate fluctuation
- Loss of intellectual property/data
- Workforce shortage
- Pension scheme funding
- Technology failure/system failure
- Failure to innovate/meet customer needs
- Environmental risk
- Increasing competition
- Outsourcing
- Interest-rate fluctuation
- Cash flow/liquidity risk
- Counterparty credit risk
- Concentration risk (product, people, geography)

Disruptive technologies/innovation
- Lack of technology infrastructure to support business needs
- Third-party liability (incl. E&O)
- Resource allocation
- Damage to reputation/brand
- Product recall
- Terrorism/sabotage
- Economic slowdown/slow recovery
- Inadequate succession planning

Weather/natural disasters
- Failure to react or retain top talent
- Failure of disaster recovery plan/business continuity plan
- Resource allocation
- Commodity price risk
- Crime/theft/fraud/employee dishonesty
- Corporate social responsibility/sustainability
- Globalisation/emerging markets

Climate change
- Aging workforce and related health issues
- Major project failure
- Natural resource scarcity/availability of raw materials
- Directors & officers personal liability
- Asset value volatility

Tag cloud based on Aon Global Risk Management Survey 2017; Munich Re weighting
**Protection gap still very large after nat cat events**

Loss events worldwide 1980–2016

<table>
<thead>
<tr>
<th>Continent</th>
<th>Overall losses US$ bn</th>
<th>Insured losses US$ bn</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>1,660</td>
<td>730</td>
</tr>
<tr>
<td>South America</td>
<td>120</td>
<td>14</td>
</tr>
<tr>
<td>Europe</td>
<td>590</td>
<td>170</td>
</tr>
<tr>
<td>Africa</td>
<td>48</td>
<td>2</td>
</tr>
<tr>
<td>Asia</td>
<td>1,660</td>
<td>135</td>
</tr>
<tr>
<td>Australia/Oceania</td>
<td>140</td>
<td>58</td>
</tr>
</tbody>
</table>

(Losses in values at 2016)

Inflation-adjusted via country-specific consumer price index and consideration of exchange-rate fluctuations between local currency and US$.

© 2017 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE – As of July 2017

Source: Munich Re, NatCatSERVICE, 2017

Monte Carlo - Media conference, 10 September 2017
Hurricane Harvey with extraordinary precipitation

- 1st landfall of a major hurricane (Cat4 at landfall) on US mainland since 2005 (Wilma)
- Due to blocking system of high pressure systems over the North American continent Harvey stuck in the Houston area for 6 days, with continuous connection to warm gulf water
- Precipitation of up to 1,300 mm set new record for Texas and is close to all time record for US set by a hurricane in Hawaii in 1950
- Slightly above-average Atlantic hurricane activity until the end of the year expected due to neutral ENSO conditions (natural climate cycle) and above-average sea surface temperatures in relevant regions
Hurricane Harvey is primarily a flood event – loss assessment is complex

- Hurricane Harvey is primarily a flood event
- Commercial and industrial risks, especially oil and petrochemical industry:
  - Wind and flood damage usually covered, often sub-limited
  - Potential business interruption losses
- Homeowners and renters policies do not generally cover flood damage, coverage can be purchased through NFIP
- Small portion of NFIP is reinsured, Munich Re America is one of the reinsurers
- Loss assessment complex, it will take long time for necessary estimates leaving high uncertainty in the market
- Too early for reliable loss estimate, regarding Munich Re well in accordance with risk appetite and strategy
How to close the insurance gap?
Examples of sovereign and public-private nat cat risk transfer schemes

- **United States**: National Flood Insurance Program (NFIP)
- **Mexico**: Fondo Nacional de Desastres Naturales (FONDEN)
- **Caribbean**: Catastrophe Risk Insurance Facility (CCRIF)
- **St. Lucia, Grenada, Jamaica**: Livelihood Protection Policy (LPP)
- **United Kingdom**: Flood Re
- **Norway**: Norsk Naturskadepool (NNPP)
- **Iceland**: Icelandic Catastrophe Insurance (ICI)
- **United States**: Central Morovia Earthquake Program (CMER)
- **Romania**: Programul Roman de Asigurare la Catastrofe (PAID)
- **Taiwan**: Residential Earthquake Insurance Pool (TREIF)
- **Philippines**: Sovereign Parametric Insurance (PSPI)
- **New Zealand**: Earthquake Commission (EQC)
- **Indonesian Catastrophe Reinsurance Pool (Maipark)
- **Pacific Islands**: Pacific Catastrophe Risk Insurance (PCRAFI)
- **Iceland**: Icelandic Catastrophe Insurance (ICI)
- **Norway**: Norsk Naturskadepool (NNPP)
- **All developing countries**: Pandemic Emergency Financing Facility (PEF)
- **St. Lucia, Grenada, Jamaica**: Livelihood Protection Policy (LPP)
- **United Kingdom**: Flood Re
Continued significant insurance gap, even in developed countries

More nat cat and sovereign risk transfer solutions for emerging countries

<table>
<thead>
<tr>
<th>Demand</th>
<th>Solution</th>
<th>Stakeholder benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood Re, UK</td>
<td>Maintain flood insurance for home owners in the UK</td>
<td></td>
</tr>
<tr>
<td>NFIP, US</td>
<td>Affordable insurance for property owners</td>
<td></td>
</tr>
<tr>
<td>Caribbean Catastrophe Risk Insurance Facility</td>
<td>Timely emergency response to reduce the economic and humanitarian impact of quakes and hurricanes</td>
<td></td>
</tr>
<tr>
<td>Cooperation with public institutions to enable private insurance coverage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More solutions for governments in emerging countries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fit for a game change

4 Financially motivated solutions
Increasing demand for financially motivated reinsurance and capital market solutions

- Close to 400 inquiries have been evaluated over the last two years
- Close to 60 transactions have been closed
- The inquiries are coming from all over the world, but with different regional patterns
- Not only insurance companies, but also captives, the public sector, and the run-off sector are target segments
In addition to risk transfer we support our clients to achieve their financial KPI’s and enable growth.

Deal experience 2015–2017

Closed Transactions

- (Regulatory) Framework: 10
- Event-driven: 24
- KPI Optimization: 5
- Other: 22

Currently Active Opportunities

- Europe: 56%
- Americas: 23%
- Asia-Pacific: 21%

Outlook

Increasing focus on reinsurance deals motivated by corporate finance objectives

**Examples**

- Large insurance companies: Relief of capital for, e.g., dividend payouts and capital optimization
- Regional insurance companies: Improve capital allocation geared towards capital relief for, e.g., future growth
- Captives: Manage volatility in the light of earnings expectations and solvency needs
- Public sector: Availability of capacity and liquidity after an event
- Run-off providers: Capital efficiency for financing transfers of portfolios

Explore, transact and scale by expanding beyond core → adding value for our clients
Fit for a game change

Cyber solutions

- Cat XL
- Non-damage BI
- Project cost insurance
- EAR
- CAR

Epidemic solutions

- Flood insurance
- Political risk
- Reputational risks
- Drone coverages
- Financially motivated solutions
- Data lake
- Automated underwriting
- Analytics Suite
- Trends

Traditional reinsurance

Capital market solutions

Expanding the boundaries of insurability

Trends

Data-driven solutions

Inland flood
Strong long-term growth in cyber (re)insurance expected
Munich Re with cutting-edge experience and market presence

GWP global cyber insurance market

<table>
<thead>
<tr>
<th>Year</th>
<th>RoW</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>2.4</td>
<td>0.3</td>
</tr>
<tr>
<td>2016</td>
<td>2.9</td>
<td>0.6</td>
</tr>
<tr>
<td>2019</td>
<td>4.7</td>
<td>2.1</td>
</tr>
<tr>
<td>2020</td>
<td>5.6</td>
<td>3.0</td>
</tr>
</tbody>
</table>

GWP Munich Re cyber portfolio

<table>
<thead>
<tr>
<th>Year</th>
<th>Insurance</th>
<th>Reinsurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>126</td>
<td>57</td>
</tr>
<tr>
<td>2014</td>
<td>135</td>
<td>74</td>
</tr>
<tr>
<td>2015</td>
<td>191</td>
<td>96</td>
</tr>
<tr>
<td>2016</td>
<td>263</td>
<td>127</td>
</tr>
</tbody>
</table>

- **Trends**
  - Increasing awareness of cyber risks: recent cyber attacks (WannaCry, Petya)
  - Growing demand in Europe - but also worldwide – gaining pace due to change in legislation (GDPR)
  - Increasing exposure driven by integration (IoT) and complexity in supply chains; not only financial and service sector is seeking cyber protection, but also industrial sector

- **High demand for expertise due to the nature of the business**
  - Complexity (e.g. very specific per industry)
  - Dynamic risk (high risk of change, importance of in-depth understanding of risk)

1 Estimates based on different external sources (Marsh & McLennan, Barbican Insurance, Allianz).
Munich Re’s cyber business strategy
Risk-taking and comprehensive service model

Our value added in cyber insurance – Where can we offer support

Primary insurance

Traditional RI

Risk assessment/ Loss mitigation

Insurance policy

Post-loss service and recovery

Traditional risk-taking approach & Service and fee-based approach

Risk assessment

Risk mitigation

Risk transfer

Recovery

Resilience

Cyber ecosystem partnerships and access to tech world (software/hardware) are the foundation for augmenting our understanding of the risk

5 Expanding the boundaries of insurability – New coverages
Course and severity of an epidemic outbreak can be influenced while it is ongoing – Pandemic Emergency Financing Facility

Casualties in the event of an epidemic (illustrative)

Relevant experience gained can be transferred to other transactions

Financing mechanisms

1 Donors make yearly payment to PEF to buy the insurance coverage. The payment is passed on to risk takers.

2 IBRD\(^1\) (a) Issues bonds in the capital markets or (b) concludes an insurance contract.

3 An outbreak happens, which activates the pre-agreed activation criteria. The money is passed on to the PEF.

4 PEF disburses the funds for the response action to various agencies or directly to the affected country.

---

1 International Bank For Reconstruction
Disclaimer

This presentation contains forward-looking statements that are based on current assumptions and forecasts of the management of Munich Re. Known and unknown risks, uncertainties and other factors could lead to material differences between the forward-looking statements given here and the actual development, in particular the results, financial situation and performance of our Company. The Company assumes no liability to update these forward-looking statements or to make them conform to future events or developments.