Chapter 11: Insurance – managing long-term risk
Overview of the book

Part I: What is sustainability and why does it matter?
1. Sustainability and the transition challenge

Part II: Sustainability’s challenges to corporates
2. Externalities - internalisation
3. Governance and behaviour
4. Coalitions for sustainable finance
5. Strategy and intangibles – changing business models
6. Integrated reporting - metrics and data

Part III: Financing sustainability
7. Investing for long-term value creation
8. Equity – investing with an ownership stake
9. Bonds – investing without voting power
10. Banks – new forms of lending
11. Insurance – managing long-term risk

Part IV: Epilogue
12. Transition management and integrated thinking
Learning objectives – chapter 11

- explain the nature of insurance business
- identify the physical risk of catastrophes
- appreciate the liability risk for environmental hazards
- understand the basics of catastrophe modelling
- explain the function of micro-insurance
Insurance and catastrophe risk
Large claims: catastrophes

Heavy-tailed distribution
# Catastrophes: the most costly insurance losses

<table>
<thead>
<tr>
<th>Insured loss (in $ billion)</th>
<th>Victims</th>
<th>Date (year)</th>
<th>Event</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.4</td>
<td>1,836</td>
<td>2005</td>
<td>Hurricane Katrina: storm surge, floods</td>
<td>US, Mexico</td>
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<tr>
<td>38.1</td>
<td>18,451</td>
<td>2011</td>
<td>Earthquake (Mw 9.0) triggers tsunami</td>
<td>Japan</td>
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<tr>
<td>32.0</td>
<td>136</td>
<td>2017</td>
<td>Hurricane Maria</td>
<td>US, Puerto Rico, Caribbean</td>
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<tr>
<td>30.8</td>
<td>237</td>
<td>2012</td>
<td>Hurricane Sandy: storm surge</td>
<td>US (New York)</td>
</tr>
<tr>
<td>30.0</td>
<td>126</td>
<td>2017</td>
<td>Hurricane Irma</td>
<td>US, Puerto Rico, Caribbean</td>
</tr>
<tr>
<td>30.0</td>
<td>89</td>
<td>2017</td>
<td>Hurricane Harvey</td>
<td>US</td>
</tr>
<tr>
<td>27.9</td>
<td>65</td>
<td>1992</td>
<td>Hurricane Andrew: floods</td>
<td>US, Bahamas</td>
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<tr>
<td>26.0</td>
<td>2,982</td>
<td>2001</td>
<td>Terror attack on WTC, Pentagon</td>
<td>US</td>
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<tr>
<td>25.3</td>
<td>61</td>
<td>1994</td>
<td>Northridge earthquake (Mw 6.7)</td>
<td>US</td>
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<tr>
<td>23.1</td>
<td>193</td>
<td>2008</td>
<td>Hurricane Ike: floods, damage to oil rigs</td>
<td>US, Caribbean</td>
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<tr>
<td>19.1</td>
<td>185</td>
<td>2011</td>
<td>Earthquake (Mw 6.1), aftershocks</td>
<td>New Zealand</td>
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<td>16.8</td>
<td>119</td>
<td>2004</td>
<td>Hurricane Ivan: damage to oil rigs</td>
<td>US, Caribbean</td>
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<tr>
<td>16.3</td>
<td>815</td>
<td>2011</td>
<td>Heavy monsoon rains: extreme flooding</td>
<td>Thailand</td>
</tr>
<tr>
<td>15.8</td>
<td>53</td>
<td>2005</td>
<td>Hurricane Wilma: torrential rains, floods</td>
<td>US, Mexico</td>
</tr>
<tr>
<td>13.5</td>
<td>34</td>
<td>2005</td>
<td>Hurricane Rita: floods, damage to oil rigs</td>
<td>US, Mexico</td>
</tr>
<tr>
<td>11.7</td>
<td>123</td>
<td>2012</td>
<td>Drought in the Corn Belt</td>
<td>US</td>
</tr>
</tbody>
</table>
Insured catastrophe losses are rising
How to share risk of catastrophe?

Individual insurers cannot bear large losses on their own.

- **Reinsurance**: slicing in layers and divide among more insurers.
- **Government programme**: for example, flood risk.
- **Cat bond**: corporate bond that allows issuer to skip payments if accident happens in return for higher return.
Why does sustainability matter to insurance?
AXA’s materiality matrix

Risks and opportunities

EXTERNAL RESPONDENTS

AXA RESPONDENTS

ENVIRONMENTAL RISKS
TECHNOLOGY RISKS
FINANCIAL RISKS
SOCIAL RISKS
HEALTH RISKS
BUSINESS CHALLENGES
Advancing its understanding of climate change risks, quantifying and integrating it into its risk management and underwriting frameworks

Developing products and services to mitigate or adapt to climate risk

Raising awareness about climate change risks through public dialogue, and advocating a worldwide policy framework for climate change

Tackling its own carbon footprint and ensuring transparent, annual emissions reporting
Sustainability scores of Allianz (by RobecoSAM)

Total Scores:
- Industry best score
- Industry average score
- Allianz SE

Economic Dimension:
- Industry best score
- Industry average score
- Allianz SE

Environmental Dimension:
- Industry best score
- Industry average score
- Allianz SE

Social Dimension:
- Industry best score
- Industry average score
- Allianz SE
Managing long-term catastrophe risk
1. The **hazard component** estimates the extent and intensity of the natural catastrophe.

2. The **vulnerability component** assesses the relative damage to the assets (like property and infrastructure).

3. The **exposure component** is split between building values, contents values and business interruption values.

4. The **financial loss component** translates the physical damage into total monetary loss before the application of insurance.

5. The **platform component** integrates the four model components.
Global Warming, at a Glance

The increase of greenhouse gases — mainly from the burning of fossil fuels — is trapping more heat in Earth’s systems, what’s commonly known as global warming. This extra heat has resulted in higher temperatures on land and the oceans, melting ice and more extreme weather.

**HEAT BLANKET**

- CO$_2$
- N$_2$O
- H$_2$O
- CH$_4$

CO$_2$ and other greenhouse gases released by the burning of fossil fuels thicken the atmospheric heat blanket, trapping more heat on Earth.

**LOWER ATMOSPHERE**

Most of that radiated heat is absorbed by greenhouse gas molecules, warming Earth’s surface and the lower atmosphere.

**UPPER ATMOSPHERE**

Solar radiation passes through the atmosphere to the Earth.

About half of this solar radiation is absorbed by the Earth — mostly by the oceans.

SOURCES: NASA; Intergovernmental Panel on Climate Change; InsideClimate News research

PAUL HORN / InsideClimate News
Climate change intensifies natural hazards

- Temperature change (heat waves)
- Sea-level rise
- Droughts
- Hurricanes (tropical cyclones)
- Heavy rainfall
- Flooding
- Landslides
Projections by the IPCC

Upper line: the highest carbon emission scenario

Lower line: most stringent carbon emission reduction scenario (‘only’ +2°C Celsius)
Sea-level rise

Increase of frequency of present 100-year events with rising sea levels
### Mitigation and adaptation

#### Mitigating strategies
- Reducing carbon emissions very important to reduce climate change
- But even if global temperature stabilised, sea-level will rise as the deep ocean warms slowly

#### Adaptation to minimise disruptions
- Insurance provides financial risk transfer, but not against physical impact
- Also disaster risk reduction measures: early warning, education, etc.

#### Low and middle-income countries more affected by adverse weather events
- Global climate risk pool to help these countries at macro level
- But can only insure extreme events that strongly exceed trend line
Climate risk pool for annual storm-surge
Micro-insurance

Micro-insurance: financial protection of low-income people and micro-enterprises

- Health risks (illness, injury, death) and property risks (damage or loss)
- Wide variety of micro-insurance risks (e.g. crop insurance, health insurance)
- Helps to deal with unexpected shocks avoiding the poverty trap

Suppliers

- Commercial insurers
- Community-based organisations and cooperatives
- Microfinance institutions

Impact

- Economic: micro-insurance firms are difficult to sustain + make profitable
- Social: improved access to healthcare + reduced catastrophic expenditures
Conclusions

- Insurers play key role in managing catastrophe risk
  - Mitigation to reduce emissions
  - Adaption to deal with natural hazards
  - And managing liability risks

- Long-term impact of climate change is uncertain
  - Catastrophe models to capture LT trends of natural hazards
  - Projected sea-level rise increases, for example, flooding of coastal areas

- Micro-insurance can protect low-income individuals against shocks