INSURANCE LINKED SECURITIES

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Overview of presentation

- Insuring catastrophes
- What is an ILS?
- The ILS market
- Structure of ILS
- Uses of ILS
- ILS from an investor’s perspective
- Actuarial involvement in ILS
- Conclusion
Insurance of catastrophes

- Catastrophes can be natural:
  - Hurricane, earthquake, flood etc.

- or man made:
  - Aviation, marine, terrorism etc.

- Major catastrophes are difficult to insure:
  - Very infrequent occurrence
  - Very high losses
  - Difficult to derive the underlying probability distribution
  - Lack of capacity in the insurance market

- The increasing cost of disasters is caused by increase in property value rather than increase in frequency
# World’s largest insurance losses

<table>
<thead>
<tr>
<th>Insured loss $bn (indexed to 2011)</th>
<th>Event</th>
<th>Year</th>
<th>No. of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>74.7</td>
<td>Hurricane Katrina (US)</td>
<td>2005</td>
<td>1,836</td>
</tr>
<tr>
<td>35.0</td>
<td>Japanese earthquake</td>
<td>2011</td>
<td>19,184</td>
</tr>
<tr>
<td>25.6</td>
<td>Hurricane Andrew (US, Bahamas)</td>
<td>1992</td>
<td>43</td>
</tr>
<tr>
<td>23.8</td>
<td>New York 9/11 attacks</td>
<td>2001</td>
<td>2,982</td>
</tr>
<tr>
<td>21.2</td>
<td>Northridge earthquake US (CA)</td>
<td>1994</td>
<td>61</td>
</tr>
<tr>
<td>21.1</td>
<td>Hurricane Ike (US, Caribbean)</td>
<td>2008</td>
<td>136</td>
</tr>
<tr>
<td>15.4</td>
<td>Hurricane Ivan (US, Caribbean)</td>
<td>2004</td>
<td>124</td>
</tr>
<tr>
<td>14.5</td>
<td>Hurricane Wilma (US, Mexico)</td>
<td>2005</td>
<td>35</td>
</tr>
<tr>
<td>12.0</td>
<td>Thailand floods</td>
<td>2011</td>
<td>813</td>
</tr>
<tr>
<td>12.0</td>
<td>New Zealand earthquake</td>
<td>2011</td>
<td>181</td>
</tr>
<tr>
<td>11.6</td>
<td>Hurricane Rita (US, Cuba)</td>
<td>2005</td>
<td>34</td>
</tr>
</tbody>
</table>

Source: Swiss Re 2012
Saffir-Simpson Wind Scale

- **Category One Hurricane**: Sustained winds 74-95 mph (64-82 kt or 119-153 km/hr).

- **Category Two Hurricane**: Sustained winds 96-110 mph (83-95 kt or 154-177 km/hr).

- **Category Three Hurricane**: Sustained winds 111-129 mph (96-112 kt or 178-208 km/hr).

- **Category Four Hurricane**: Sustained winds 130-156 mph (113-136 kt or 209-251 km/hr).

- **Category Five Hurricane**: Sustained winds greater than 156 mph (136 kt or 251 km/hr).
Insurance v capital markets

- $100bn plus catastrophe loss possible (likely?)
- Large loss would seriously reduce insurance market underwriting capacity
- Capital markets much larger than insurance markets
- 1% change in value of New York Stock Exchange equivalent to major catastrophe ($75bn)
- Scope to transfer insurance risks to the capital markets
What is an ILS?

- ILS can be defined as financial instruments whose values are driven by insurance loss events.

- Types of ILS include:
  - Catastrophe bonds
  - Sidecars
  - Industry loss warranties
  - Private transactions
  - Embedded value securitisations

- The ILS market accounts for 14% of global catastrophe reinsurance capacity.

- Significant scope for further market expansion.
Operation of a typical ILS (simplified)

- Insurer or reinsurer establishes a vehicle to cover specified risk e.g. a higher £5m layer in a catastrophe cover for 12 months

- Insurer or reinsurer pays premium, say £0.5m into vehicle

- Investors capitalise vehicle for £4.5m

- If event occurs, insurer or reinsurer receives £5m

- If event does not occur, investors receive £0.5m premium plus return of £4.5m capital, i.e. an 11% return
Cat bond structure

Sponsoring insurance or reinsurance company 

Premium 

Insurance cover 

Capital 

Special purpose vehicle 

High quality securities 

Capital 

Interest and principal 

Investors 

Source: Swiss Re 2011
Catastrophe bonds (1)

- Securitised transactions
- Normally listed on a recognised stock exchange:
  - Cayman
  - Bermuda
  - Chicago
  - London? 2013
  - Why not CISX?
Catastrophe bonds (2)

- Issued for a finite risk period (often one year but can be up to 5)
- Often have a rating from a rating agency, typically BB or BBB
- Issued by SPVs based in Bermuda, Cayman, Ireland or Guernsey
- Normally cover natural catastrophes
Sidecars

- Limited purpose companies established by an insurance or a reinsurance company
- Limited lifetime (normally 24 months or less)
- Capital is provided by external investors (e.g. hedge funds)
- Sidecar accepts quota share reinsurance from sponsoring insurance or reinsurance company in return for premium
- Capital must be sufficient to meet maximum claims (fully funded)
- Investors receive return of capital plus premium less any claims
- Possibility of moral hazard due to information asymmetry
Industry loss warranties

- Reinsurance or derivative contracts where the pay-out is based on total loss arising from an event to the entire insurance industry

- Pay-outs based on a loss reporting index published by major reinsurers or the Property Claims Services organisation

- Normally based on hurricane or earthquake damage

- Specific types of ILWs include:
  - Live Cat – traded whilst event is in progress
  - Dead Cat – traded after event has occurred but before losses known
  - Back-up covers – protection for events that occur after a catastrophe has occurred
Private transactions

- Non-securitised transactions
- No secondary market
- Lower expenses than securitised transactions
- Coverage can include man made as well as natural disasters:
  - Aviation
  - Infrastructure
  - Marine
  - Oil rigs
Start of the ILS market

- ILS market started in the 1992 following Hurricane Andrew
- First contracts were options launched by the Chicago Board of Trade
- Early contracts based on aggregate industry loss indices
- First successful Cat bond issued by Hannover Re in 1994
- First Cat bond issued by non-financial firm in 1999 to cover earthquake losses for the owner of Tokyo Disneyland
- Major catastrophes occurred in 2005 – hurricanes Katrina, Rita, Wilma, Ophelia and Dennis caused over $100bn insured losses
- Large increase in Cat bond issuance in 2006 and 2007 to rebuild market capacity for catastrophe insurance
- Sharp reduction in new Cat bond issuance in 2008
The ILS and ILW market

- The ILS and ILW market provides 14% of global catastrophe reinsurance capacity
- ILW market worth $7bn per year
- Strong increase in demand observed in 2012
- Cat bond market $15bn per year but expected to double by 2016
- Non-securitised market thought to be much larger than the securitised market
Structure of ILS

- ILS issued by sponsoring company – normally an insurance or reinsurance company

- ILS can have:
  - Parametric triggers or
  - Indemnity triggers

- ILS can be structured as protected cell companies

- Most ILS are liability securitisations but embedded value ILS are asset securitisations
Use of cell companies

- ILS can be structured as protected cell or incorporated cell companies with separate cells being used for individual transactions
- Cells act as transformer vehicles to reinsure the insurance risk and issue matching securities for investors
Parametric triggers

- Also called synthetic triggers

- Capital at risk if certain event occurs:
  - Earthquake over a certain magnitude (e.g. 7.0) occurs
  - Hurricane hits specified location with specified minimum category (e.g. 3)

- Capital loss can vary by size of event, e.g. pay out on a sliding scale depending on earthquake magnitude between 7 and 9
Indemnity triggers

- Similar to conventional catastrophe reinsurance
- Triggered by the issuer’s actual loss
- Provides exact match to issuer’s liabilities
- Complex to price as knowledge of issuer’s portfolio is required
- Claims settlements can cause delays, especially if the issuer is a reinsurer.
Other triggers

- Modelled loss
  - Trigger based on specific cat model applied to an exposure portfolio

- Indexed to industry loss
  - Triggered when industry loss from certain peril reaches defined threshold

- Parametric index
  - Based on a combination of parameters
Pricing of ILS

- Catastrophe models – EQECAT, AIR, RMS
- Use of extreme value theory
- Pickands–Balkema–de Haan theorem
  - The conditional excess distribution function is well approximated by the generalised Pareto distribution
Perils covered

- Perils covered include:
  - Hurricane
  - US wind storm
  - European wind storm
  - Earthquake
  - Flood
  - Wildfire
  - Tsunami
  - Extreme mortality
  - Longevity
Uses of ILS

- Proprietary insurers
- Reinsurers
- Covering governmental liabilities
  - Mexican earthquake risks 2006
  - Caribbean Catastrophe Risk Insurance Facility (CCRIF)
Benefits of ILS for sponsor

- Can act as a substitute for traditional reinsurance if price is comparable
- Expansion of reinsurance capacity for catastrophe risks
- If cover is multi-year, Cat bonds secure protection across several renewals
- Reduction in dependence on underwriting cycle
- Payments made quickly once event triggered
- No claim disputes prolonging payment
- Reduction in counterparty risk
ILS and Solvency II

- Solvency II will increase insurers’ capital requirements which will lead to a greater transfer of cat risks to reinsurers
- Solvency II will also introduce the need for approval of internal models by insurance supervisors
- Insurers will not be able to rely on proprietary cat models without incorporating them into their internal model review process
- Changes to proprietary cat models may necessitate re-approval of insurers’ own internal models
- May lead to further increased transfer of catastrophe risk to the reinsurance market
- Possible further increased demand for cat bonds as a result
ILS from an investor’s perspective

- ILS have a low correlation with other asset classes
- ILS funds invest in a range of ILS to achieve geographical and risk type diversification
- No information asymmetry between sponsor and investor
- Open-ended funds
- Closed ended funds
Cat bond investment performance

- Cat bonds are priced at spreads over LIBOR
- Spread is the price of the risk covered
- Low correlation between cat bond and corporate bond returns
- Unlike individual corporate bonds, cat bonds provide risk diversification
- Theoretically cat bonds should offer lower returns than corporate bonds of same credit rating but opposite is true
- Average annual return since 2002 is approximately 8%
- Annual volatility only 2.75% since 2002
- High returns caused by investor unfamiliarity?
Risks involved with ILS investment

- Individual ILS can involve total loss of capital
- Multiple catastrophes can lead to poor overall return in the ILS market
- Poor geographical and peril diversification can lead to volatile returns for ILS funds
- Credit risk of collateral counterparty
Actuarial involvement in ILS

- Pricing
- Catastrophe modelling
- Portfolio selection
  - Selecting individual ILS securities to form an ILS fund
Conclusion

- The use of ILS to provide additional reinsurance category is growing rapidly
- There is a need for investor education on the structure and risks of ILS
- The creation of specialised ILS funds has the potential to open this asset class to ordinary investors
- There is an opportunity for Guernsey to increase its involvement in this area
References

- Pricing of catastrophe linked securities - Stavros Christofides (ASTIN Colloquium Bergen 2004)