


The Actuarial Profession
making financial sense of the future

IMPLICATIONS OF CLIMATE CHANGE FOR GENERAL INSURANCE

CELTIC MANOR RESORT, NEWPORT, WALES

Trevor Maynard
Graham Fulcher




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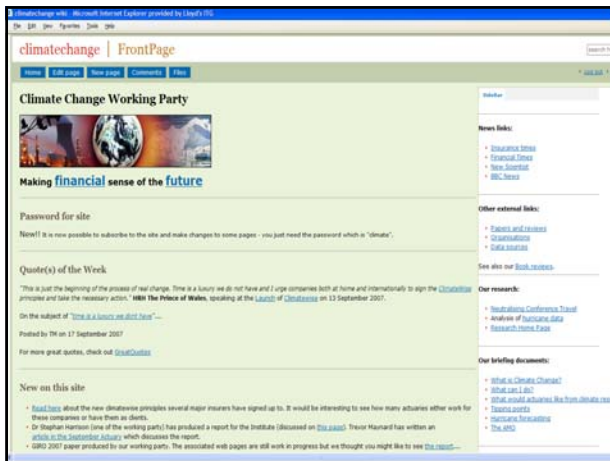
If CO2 Levels don't PETER out How will insurance companies COPE/MANage?

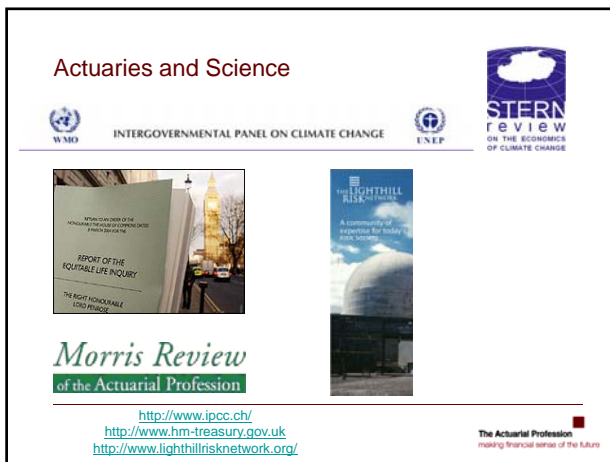
The Climate Change Working Party

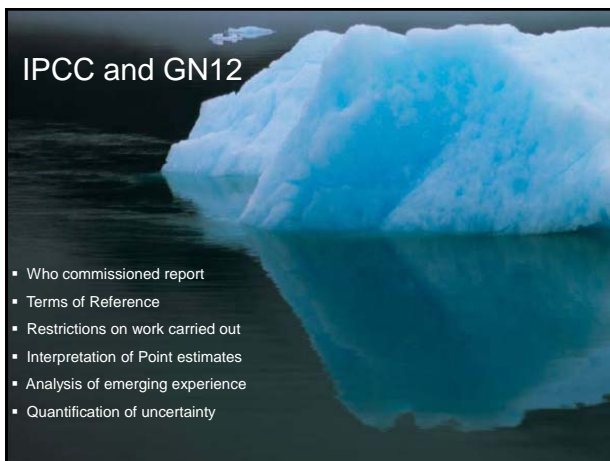
| | |
|------------------------|-----------------------|
| Dr Neil Bruce | Dr Richenda Connell |
| Catherine Cernesson | Daniel Hawellek |
| Graham Fulcher | Dr Celine Herweijer |
| Lyndsey Gardner | Dr Steve Jewson |
| Laura Masi | Professor Lenny Smith |
| Trevor Maynard (Chair) | Dr Dave Stainforth |
| Vinay Mistry | |
| David Rochester | |
| Nick Silver | |

<http://climatechange.pbwiki.com>


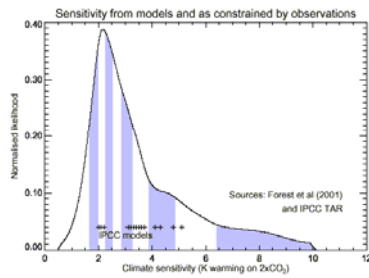
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Quantification of Uncertainty



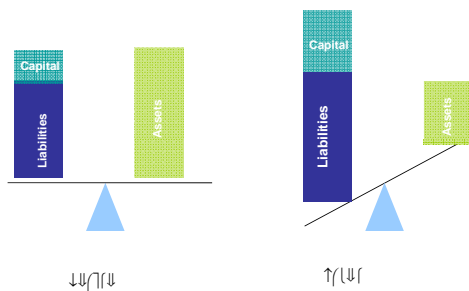
climateprediction.net

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IPCC and GN12

- Who commissioned report
- Terms of Reference
- Restrictions on work carried out
- Interpretation of Point estimates
- Analysis of emerging experience
- Quantification of uncertainty
- Possibility of material adverse deterioration

A treble whammy: Assets/Liabilities/Capital



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Or a Quadruple Whammy – Reputation Risk



<http://www.citizensfla.com>
www.sbafla.com/hcflhttp
www.thamesweb.com/

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**If CO2 Levels don't PETER out
 How will insurance companies
 COPE/MANage?**

Risks

Property covers

- Wind
 - Stronger
 - Longer
 - More?
- Flood
 - Wetter ground
 - Larger thunderstorms/flash events
 - Changed storm tracks
 - Higher sea levels
- Subsidence
- Fire



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Risks

Liability

- D&O – negligent management causing:
 - 3rd party losses **as a result of** their company's emissions
 - Exposure to **impacts** of climate change
 - Reasonable foreseeability
- Professional Indemnity - bad planning?
 - architects, consulting engineers, designers, surveyors, contractors, developers and financiers (etc)
- Environmental Liability
 - CO₂ is a pollutant
(supreme court ruling on Massachusetts vs EPA)
 - <http://www.climatelaw.org/>
- Airlines?

<http://climatechange.pbwiki.com/GiRo07Liability->

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Risks

Political Risk/Terrorism

- Covers: Seizure of property, contract frustration etc
- Tensions likely to increase globally
 - Backdrop of population growth
 - Water disputes
 - Energy shortages
 - Loss of land => migrations
 - Reduced agriculture
 - Economic impact => migrations



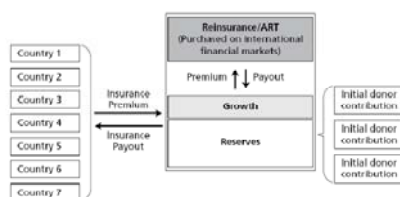
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Opportunities

Innovative insurance cover - CCRIF

- Caribbean has a history of natural disasters
- Caribbean Community worked with World Bank to establish....
...Caribbean Catastrophe Risk Insurance Facility (CCRIF) .

Figure 1. Structure of CCRIF



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Opportunities

Innovative insurance cover - CCRIF

Index calculation:

- Key locations selected
- Measure Windspeed
- Apply economic weights

Figure A2.6. Economic Centers for Sample Country



$$\text{Index} = \sum_{\text{locations}=l} \text{weight}_l \times \max(0, (\text{windspeed} - 50)^\beta)$$

Source: <http://www.worldbank.org/CCRIC/CCRICResources/ResultofResearch/ResearchDesignofCaribbeanCatastropheRiskInsuranceFund.pdf>

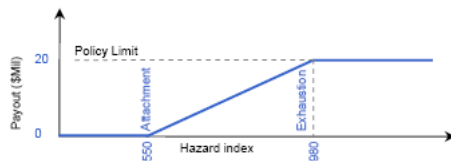
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Opportunities

Innovative insurance cover - CCRIF

Calculate payout:

- Compare index to payout graph
- Attachment point and exhaustion in terms of index values
- Calibrated using advanced catastrophe modelling (Eqecat)



Source: <http://www.worldbank.org/CCRIC/CCRICResources/ResultofResearch/ResearchDesignofCaribbeanCatastropheRiskInsuranceFund.pdf>

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Opportunities

Innovative insurance cover - CCRIF

USD 20m - Catastrophe Swap (Derivative)

USD 50m - reinsurance

USD 25m - reinsurance

USD 15m - reinsurance

USD 10m - retained by CCRIF

GROW ↑

SHRINK ↓

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Opportunities

Innovative insurance cover - CCRIF

- Benefits:
 - Liquidity - Immediate payment
 - No moral hazard – index can't be gamed
 - Lower operating costs
 - Transparency
 - Access to financial markets
- Issues
 - Basis risk
 - Reputational Risk
 - Education challenge
 - Not all hazards are modelled well

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Opportunities

Insurance for the developing world

- Reinsurers (Swiss Re, Axa) - weather derivative contracts protecting communities in Africa.
- Ground breaking climate modelling
- Payout based on a blend of satellite and weather data, a **proxy** for impact on crop production.
- **Collaboration:** Swiss Re, Columbia University and the Millennium Promise Alliance
- Insurance companies don't have all the answers – we don't want to **overpromise**.

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Opportunities

Renewable Energy Insurance

- Ascot Underwriting established Renewco Underwriting (2007).
 - specifically dedicated to worldwide renewable energy industry
 - onshore and offshore coverage
 - solar, wave, tidal, wind, biomass, geothermal and small hydroelectric fields.
- Ace European Group launched Ace Renewable Energy (2007)
 - comprehensive cover....
 - including waste to energy, waste management and the production of biofuels



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10 things to do

- Convince yourself (1) and others (2)
- Engage with scientists on working parties, LRN / wiki (3)
- Ensure its taken seriously internally:
 - Strategy (4)
 - Liabilities: Property (5) and Casualty (6)
 - Assets (7)
- Look at opportunities (8)
- Reduce Carbon foot print
 - your company's (9) and your own (10)

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Who works for/with these companies?

| | | |
|----------|-------------------|-------------------------|
| ABI | Diagonal | Navigators |
| ACE | Equity | NFU Mutual |
| AIG | F&C | Prudential |
| Allianz | Friends Provident | QBE European Operations |
| Amclin | Hardy | RBS |
| Ark | HBOS | RMS |
| Aviva | Hiscox | RSA |
| AXA | Kiln | Standard Life |
| Beazley | Legal and General | Swiss Re |
| Benfield | Lloyd's | UNUM |
| BIBA | Lloyds TSB | XL |
| Catlin | Marketform | Zurich |
| Chaucer | Munich Re | |
| CIS | | |

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Of actuaries at GIRO:

31% Work for signatory companies

32% Have signatories as clients, customers
or regulate them (at least)

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- Lead in risk analysis
- Inform public policy making
- Support climate awareness amongst our customers
- Incorporate climate change into our investment strategies
- Reduce the environmental impact of our business
- Report and be transparent

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Lead in risk analysis

- Research to inform business strategy
- Improve data quality
- Reflect climate change in pricing, reserves and capital
- Share research through an appropriate forum

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Support climate awareness amongst our customers

- Provide tools so they can assess risk
- Assist developing world

Incorporate into investment strategies

- This is not just SRI...
- Responsible engagement!

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Reduce environmental impact of our business

- Measure environmental impact
- Calculate and disclose emissions

Report and be accountable

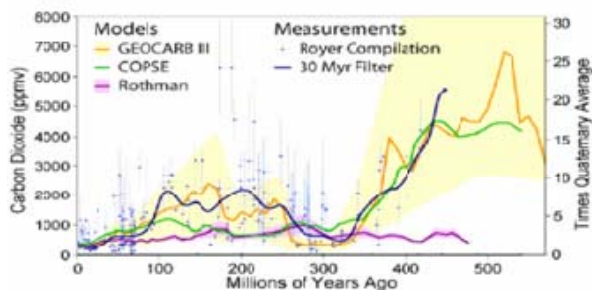
- Recognise climate change at board level
 - Annual reporting...
- ...expect close scrutiny from NGOs

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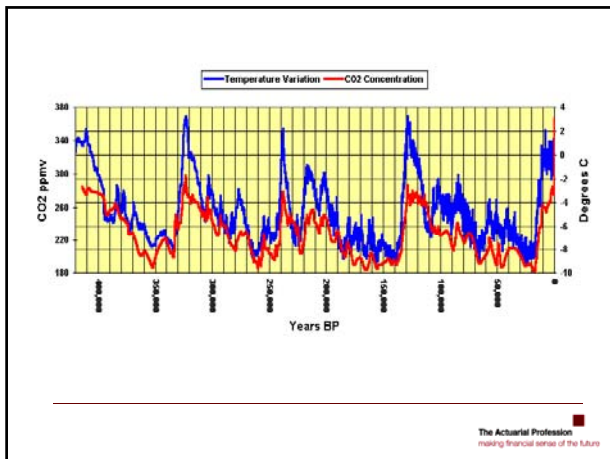
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Sessional Meeting
26 November 2007
Climate Change



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CO₂ is enough

- <http://www.realclimate.org/index.php/archives/2007/04/learning-from-a-simple-model>
- <http://www.realclimate.org/index.php/archives/2007/08/the-co2-problem-in-6-easy-steps/#more-462>
