

The Climate Resilience Gap

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SSTI

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Climate Products

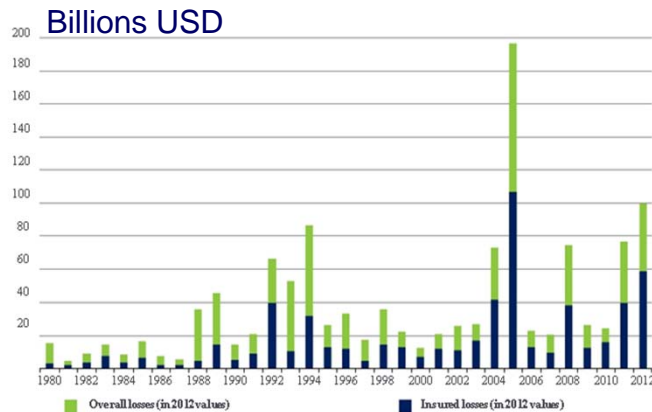
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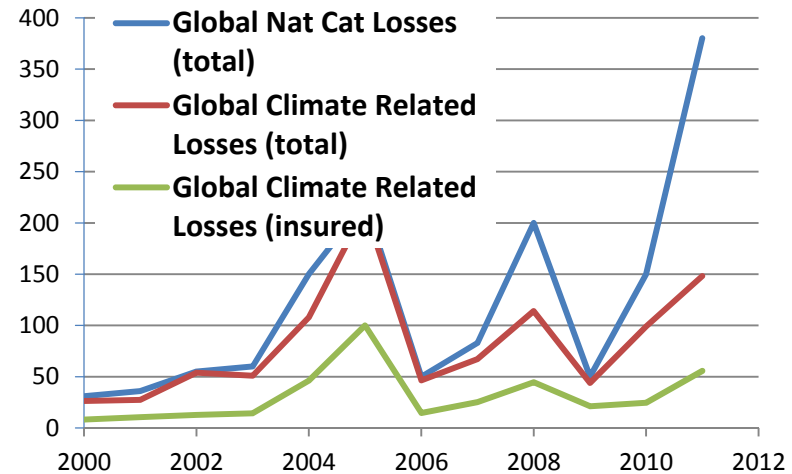
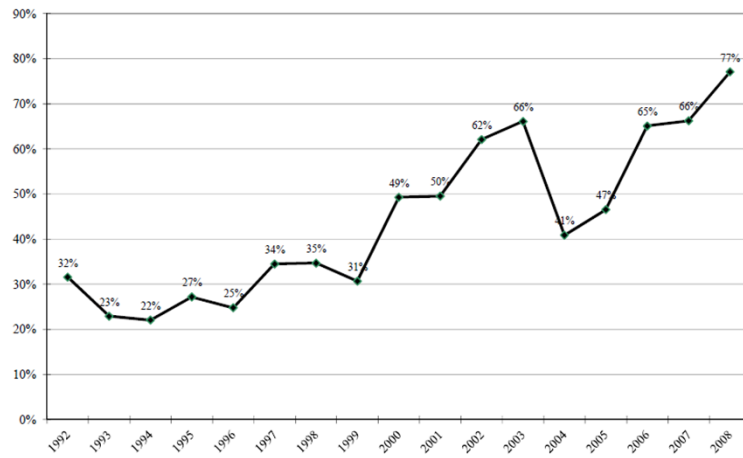
Climate Change Impacts: Loss / s ?

Worldwide Natural Disasters Losses 1980 – 2012 & US Disaster Payments v Total Loss Cost Ratio



Source: MR NatCatSERVICE 2012

Figure 4: Ratio of Total Federal Government Disaster Expenditures to Measured Losses
Source: Cummins, Suher, and Zanjani (2010)²



Derived from MR NatCatSERVICE data 2012

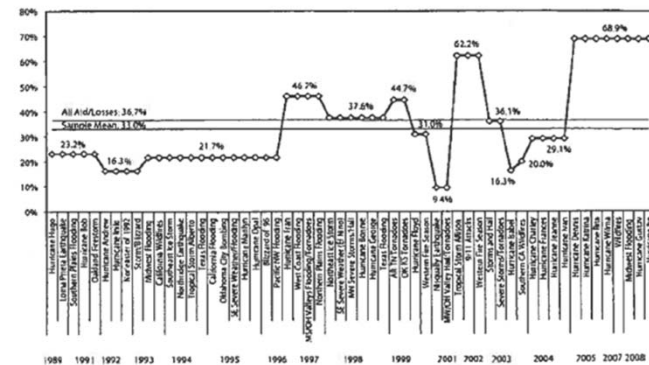


Fig. 4.3 Federal aid ratios: 1989 to 2008

Note: Each data point represents a specific disaster in our sample, with labels for the most significant disasters. The "all aid/losses" ratio is computed after adjusting loss and aid figures by our 2008 exposure index. This index captures both price-level changes and changes in the size of the housing stock. This yields a ratio that is not overweighted by recent disasters.

Cummins 2010 / 2013 Unfunded Federal Disaster Response Costs



*Over 75 year horizon
2008 dollars

*Social Security: 4.7T
GAO

*Unfunded Federal Disaster Recovery Costs \$1.1 T – 5.4T
Cummins (2010 / update 2013)

*Current US State Cat Funds
\$3T USD underfunded according to

<http://www.hawaiireporter.com/hurricane-sandy-pacific-tsunami-scary-expose-state-catastrophe-debts/123>
Citing GAO-10-568R Natural Catastrophe Insurance Coverage GAO 2010
Federal Financial Exposure to Natural Catastrophe Risk” J.David Cummins, Michael Suher, and George Zanjani (2010),
corrected.

U.S. Government Accountability Office (GAO) High Risk Report and Congressional Testimony



GAO added climate change to its list of :”the highest risks to the U.S. Government.”
Testimony of Comptroller General 2/14/13 House Committee on Oversight and Government Reform

GAO elaborated:

“Climate change poses risks to many environmental and economic systems – including agriculture, infrastructure, ecosystems, and human health – and presents a significant financial risk to the federal government.”

GAO cited include the vast amounts of property and infrastructure owned by the U.S. government, growing liability for federal flood and crop insurance programs, the need for increased technical aid for state and local governments, and additional disaster assistance required for extreme weather events like Hurricane Sandy.
See GAO High Risk Series, An Update, GAO 13-283 February 2013

Climate Resilience Gap



World Bank Definition Of Resilience

- ‘the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to, and recover from the effects of hazard in a timely manner, including through the preservation and restoration of its essential basic structures and functions’. (Dickson, et. al, 2012).

US DHS Definition of Resilience

- ‘...the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies. One major component of resilience is the capacity of society’s assets or its built environment to withstand or quickly recover from weather-related catastrophes...’

What Happens When There Is Not Enough Money to Pay for Loss and Damage ?

- It depends...
 - recent research suggesting that it is only the uninsured portion of a disaster loss that tends to lead to permanent macroeconomic losses
(von Peter, G., S. von Dahlen, S. Saxena (2012). "Unmitigated disasters? New evidence on the macroeconomic cost of natural catastrophes." Working Paper, Bank for International Settlements)
 - Potential tort litigation ? (see Geneva Association
http://www.genevaassociation.org/PDF/Risk_Management/GA2011-RMSC5.pdf) (See also
<http://web.law.columbia.edu/climate-change>)

Insurance Is Part of the Solution to Bridging the Climate Gap



BANK FOR INTERNATIONAL SETTLEMENTS

BIS Working Papers No 394

Unmitigated disasters?

New evidence on the
macroeconomic cost of
natural catastrophes

by Goetz von Peter, Sebastian von Dahlen, Sweta Saxena
Monetary and Economic Department
December 2012

JEL classification: G22, O11, O44, Q54.

Keywords: Natural catastrophes, disasters, economic growth,
insurance, risk transfer, reinsurance, recovery, development.

“Abstract

This paper presents a large panel study on the macroeconomic consequences of natural catastrophes and analyzes the extent to which risk transfer to insurance markets facilitates economic recovery. **Our main results are that major natural catastrophes have large and significant negative effects on economic activity, both on impact and over the longer run. However, it is mainly the uninsured losses that drive the subsequent macroeconomic cost, whereas sufficiently insured events are inconsequential in terms of foregone output.** This result helps to disentangle conflicting findings in the literature, and puts the focus on risk transfer mechanisms to help mitigate the macroeconomic costs of natural catastrophes.”
(emphasis added)

Role of Risk Transfer



The role of risk transfer

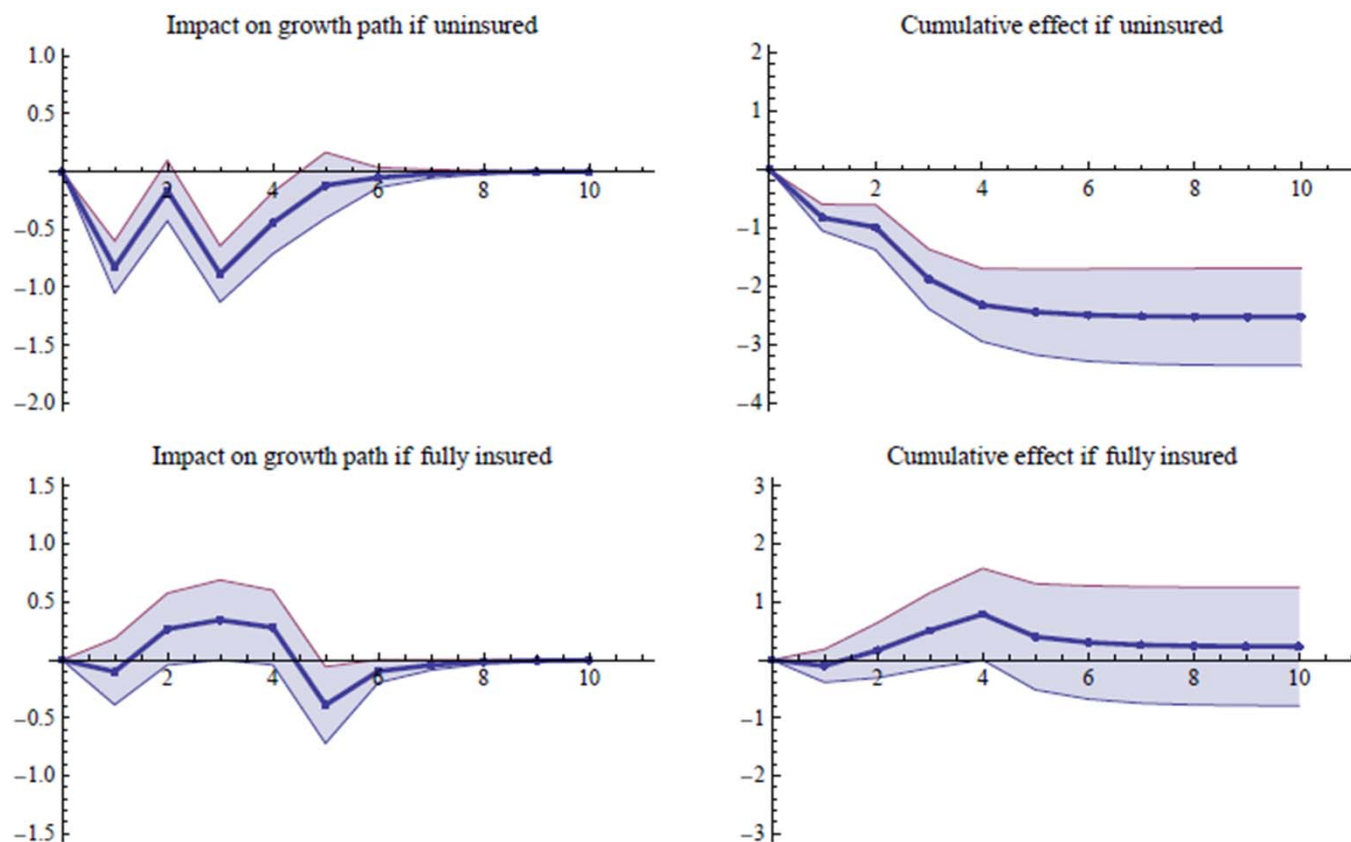


Figure 4: The impulse response function traces out the path of GDP growth over time by simulating the recursive equation (4) using the regressor $\text{Log10}(\text{Loss})$, with the estimated coefficients from Table 3 (column 1), as described under Figure 2 (10,000 realizations). The upper panels simulate the growth response to a completely uninsured event of severity equal to the mean size of uninsured losses in the sample. The lower panels simulate a hypothetical fully (100%) insured event of severity equal to the mean size of insured losses.

“Unmitigated Disasters? New Evidence on the Macroeconomic Costs of Natural Catastrophes”, von Peter, et al 5 December 2012, BIS Working papers no 394. Available at www.bis.org
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Climate Change Legal Liability: Tort Liability; Administrative Action

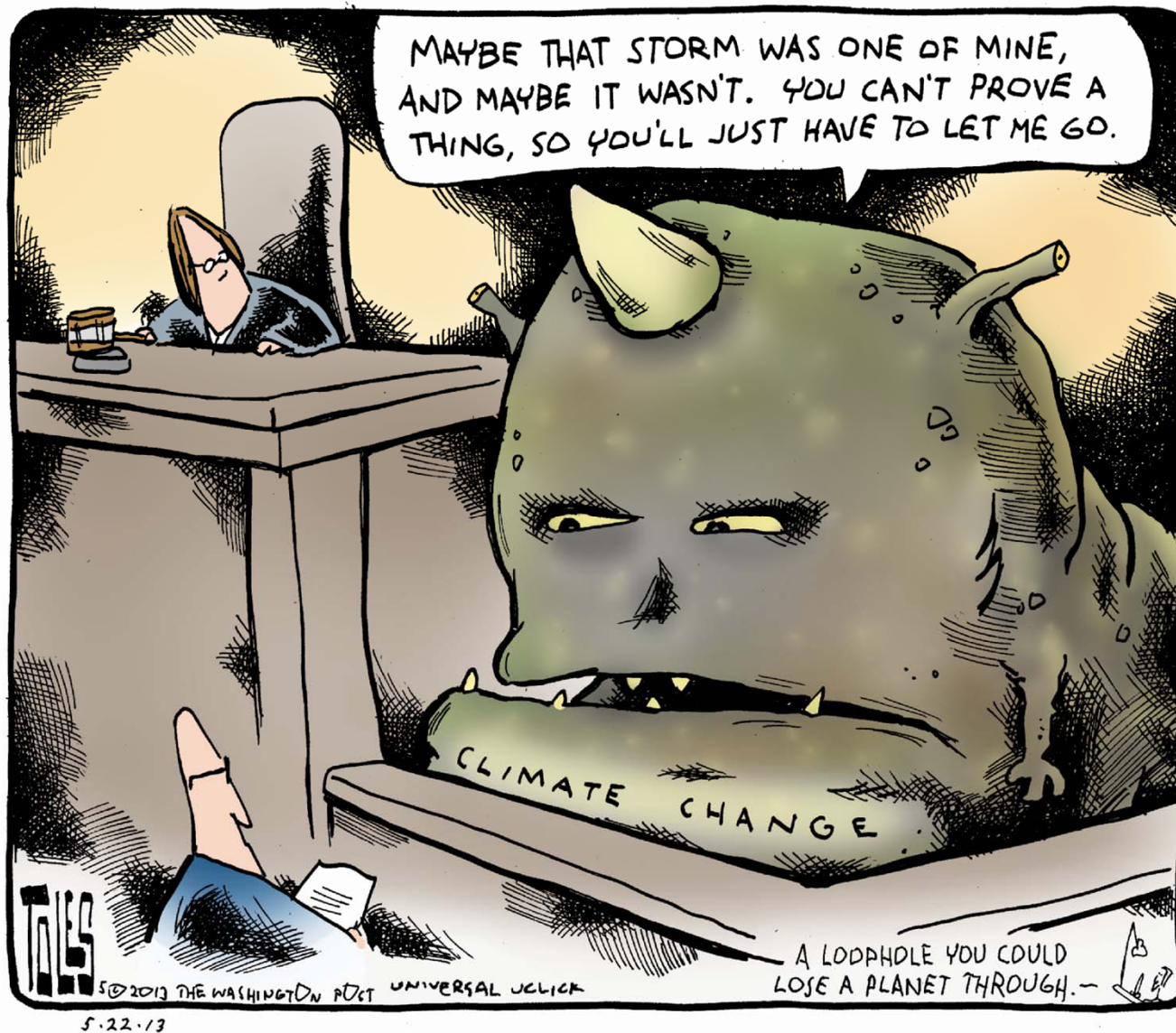


- Recent U.S. Climate Change Liability Decisions

- *AEP v. Connecticut*
- *Comer v. Murphy Oil*
- *Native Vill. of Kivalina v. Exxon Mobil*
- *Lattimore v. United States*, No. 12-1092 (Supreme Court)
 - Known as *In Re Katrina Canal Breaches Consolidated Litigation*

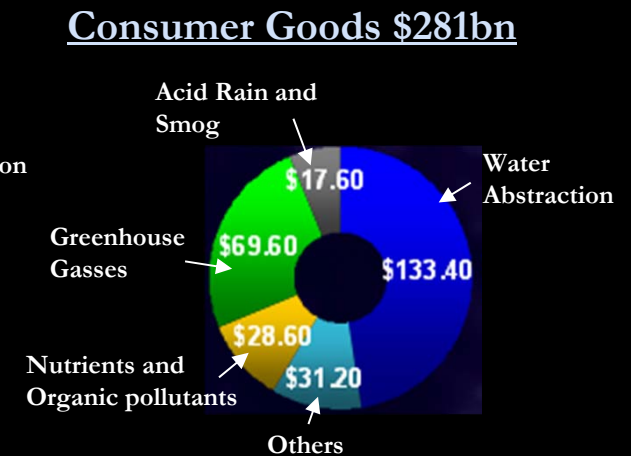
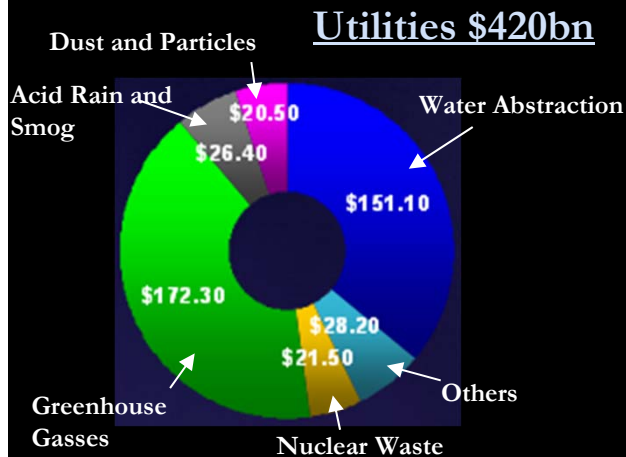
- Administrative / Civil Actions

- *Czech Republic/Micronesia* (2009-2011)
- *Palau* (2011)
- *Stichting Urgenda* (2013)
- *Bangladesh* (2011): first country in the world to incorporate climate change into its constitution
- CEQ: Draft NEPA Guidance On Consideration of The Effects Of Climate Change And Greenhouse Gas Emissions



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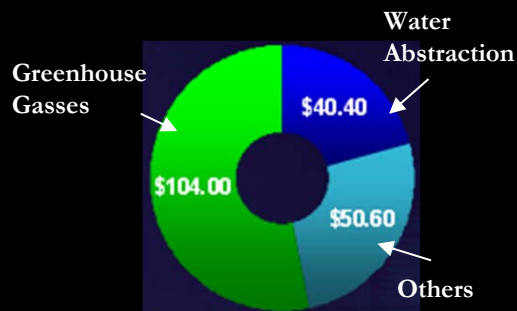
Increased Flooding Risk, Adaptation & Insurance Cost of Damage to the Environment by Business Sector



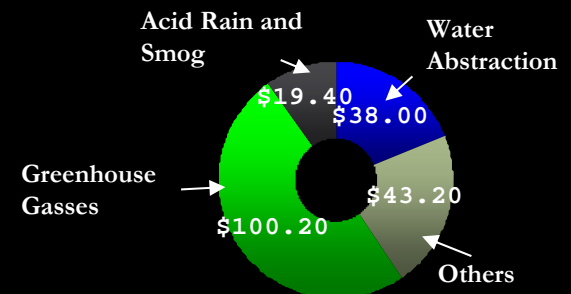
Consumer Services \$73.7bn



Industrials \$201bn



Oil and Gas \$175bn



Cost of some other sectors: Financials \$26.7bn, Healthcare \$15.5bn, Technology \$20.3bn, Telecommunications \$8.6bn

EU Attribution Study: EUCLIA

<http://ec.europa.eu/research/participants/portal/page/operation?callIdentifier=FP7-SPACE-2013-1>



SPA.2013.1.1-05: Attribution products

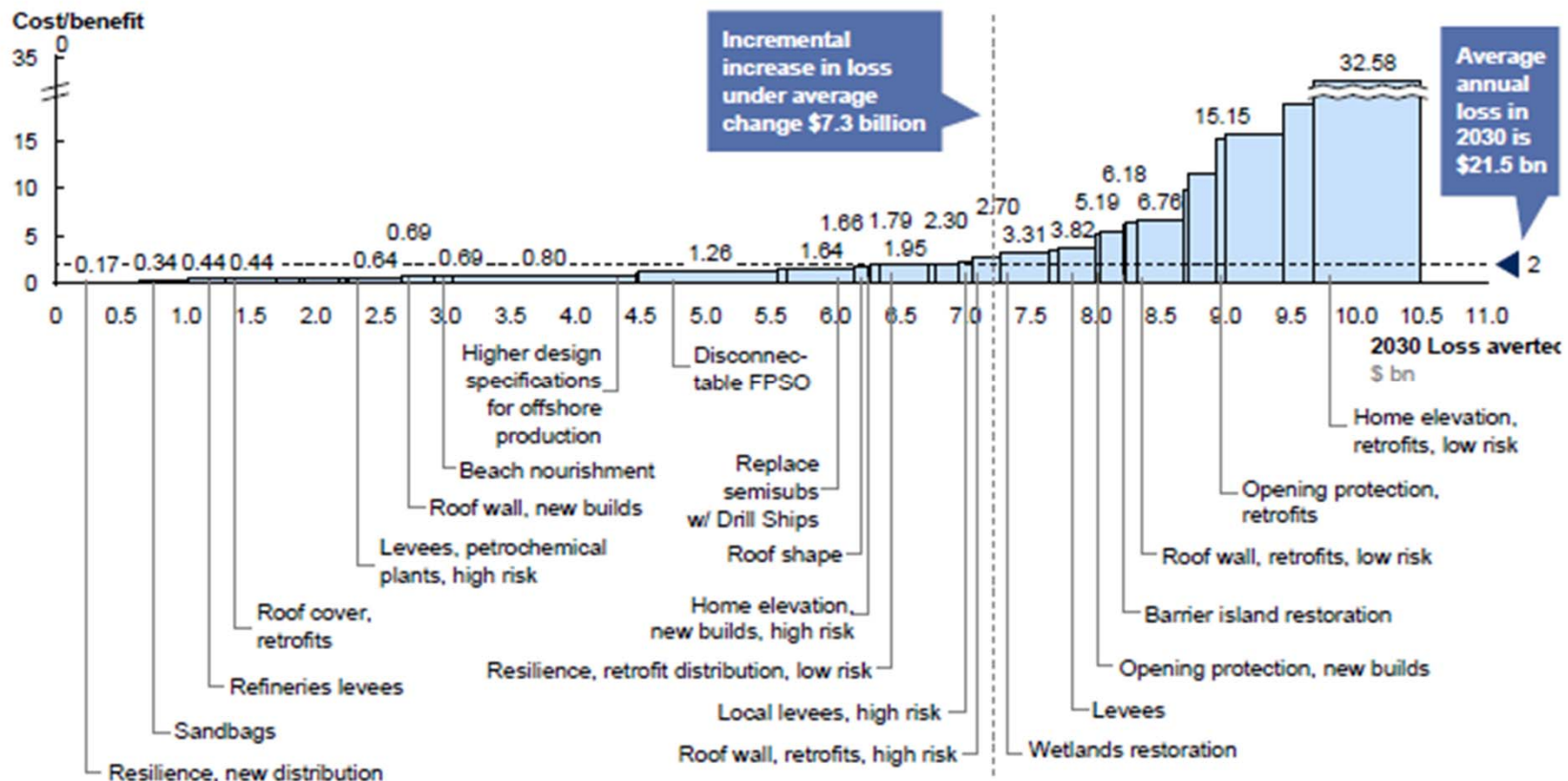
A series of attribution products are to be developed by using a climate model to determine the expected response to a particular climate forcing. Model projections (at regional and/or global level) are to be performed with different climate forcings; i) with natural forcings (solar radiation and geological factors) only; ii) with natural and anthropogenic forcings. Differences in the projections can then be attributed in a probabilistic manner to the effect of anthropogenic forcing. This activity should study a number of historical cases, related to flooding, droughts and storm surge events, and identify as to whether (and what) anthropogenic factors may have contributed to their occurrences. The activity should provide evidence as to whether the risk for a similar event has increased, decreased or remained stable. It should also propose exhaustive diagnostics of climate processes for cases under study and list areas where the science, or observables (their coverage, or precision), are still too uncertain to make a robust assessment of the change in risk. Where there are gaps identified, an identification of the observation concepts required would be valuable.

Work Products

- The project is expected to significantly contribute toward the (pre-)operational capacities in the climate change context of GMES by providing information on how likely high impact environmental disasters are attributable to natural climate variability or human-induced effects. This should enable the growth of a downstream service sector. Additionally, the methodology developed by this project in order to quantify the enhanced risks of extreme climate states and severe weather events is expected to contribute to the development of climate change adaptation strategies, both for commercial activities as well as policy initiatives.

Climate Change Impact – An Insurers Perspective

Cost Benefit to Adaptive Actions



The width of each bar in a cost curve represents the total potential of that measure to reduce expected loss up to 2030 for a given scenario. The height of each bar represents the ratio between costs and benefits for that measure. The range of measures from least to most cost-efficient align left to right. © Entergy ECA 2012

Actuarial Climate Risk Index

American Academy of Actuaries, Casualty Actuarial Society, Canadian Institute of Actuaries and the Society of Actuaries



Collaboration to pursue the creation of the Actuarial Climate Risk Index (ACRI).

Phase 1:

- framework design phase, the project now proceeds to the structuring phase

Phase 2:

- integration of regional composite indicators overlain with
- relevant multi-year regional climatic models
- regional economic impacts

Outputs possible: prediction of longer term loss impacts in a particular region.

If completed ACRI basis for:

- insurance underwriting;
- related cost-benefit analyses for risk mitigation and adaptation; and
- a dialogue between policy makers and the insurance industry about regional and local capital needs over time to reduce the climate resilience gap and achieve resilience.

See “Determining the Impact of Climate Change on Insurance Risk and the Global Community: Phase 1: Key Indicators”, American Academy of Actuaries, Casualty Actuarial Society, Canadian Institute of Actuaries and the Society of Actuaries, December 2012 for Phase 1 work product.

Climate Change Impact – An Insurers Perspective

Capabilities and Impacts



- Climate change impacts different insurers differently
- Share expertise to help mitigate the economic risks.
- Restructure products / build new products
(http://www.rms.com/news/NewsPress/PR_022711_v11ushu.asp 28 Feb 2011 RMS upgrades models); American Academy of Actuaries, Casualty Actuarial Society , Canadian Institute of Actuaries on the development of an "Actuaries Climate Risk Index" (ACRI)
- Consider more closely the increasing concentrations of exposure in coastal areas. Balance demand with resilience and use insurance to insert resilience through BETTERMENT ENDORSEMENTS
- Think proactively about ‘on the ground’ response to flood events and work closely with government and disaster relief agencies on disaster planning.
- Consider the impact that an unstable climate could have on global asset values, which may generate a mismatch against insurance liabilities.

Can Infrastructure Be Insured ?

...It Depends ...



- US Comptroller General 'Self Insurance Rule'
 - Check for State parallels
- Sovereign – liability limitations
- Privatization –
 - Precedent for insuring some aspects of guaranteed cost contracts for highway maintenance (TX and VA)

Climate Resilience Gap Conclusions



- The frequency and severity of climate driven natural disasters is increasing.
- The percentage of natural disaster damage that is insured is decreasing.
- It is mainly the uninsured losses that drive the subsequent macroeconomic cost, whereas sufficiently insured events are inconsequential in terms of foregone output.
- High potential risks are becoming uninsurable.
- The “current state” of resilience response is not sustainable.
- A significant investment in resilient infrastructure and development is required.
- We are in a period where an upgrade of infrastructure is critical – adaptation should be implemented as a component of this investment.
- Other adaptation tools are available and should be considered.

