

Climate Risk Management & Institutional Learning

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Please pardon the paucity of references. They will be added in the final version.

Introduction

The management of risks involves their identification, characterisation, quantification of occurrence probability and consequences, followed by development of strategies to reduce event probabilities, and/or ameliorate their adverse consequences once they have occurred. The most recent concerns about global climate change date back to the 70s – this was the risk identification stage. The characterisation and quantification of the risk has involved many bodies, the most prominent being the IPCC. Taking measures to reduce its probability of occurrence (mitigation) has been the realm of COP negotiations. Measures for risk management have been specified under article 4.8 of UNFCCC and the subject of increasing effort as the magnitude of climate change impacts and inadequacy of current mitigation efforts grow more evident.

Tragically, climate change impacts have grown more prominent over the past two decades, and they may be growing to a stage where their management will force adoption of practices that are explicit in their assessment and management of risks in general and climate impact related risks in particular. By far the largest benefit of the new awareness of risks from climate change is the adoption of a more systematic risk management in planning human activities ranging from supply chain logistics to urban planning.

Insurance companies are a prominent mechanism for risk transfers. Many initiatives are looking towards private-public partnerships and new risk management instruments to provide a cushion for climate change related impacts. In order for this aspiration to be fulfilled, the insurers and institutions within which they operate need to learn about emergent risks and develop workable strategies. We propose that there are three factors shaping the evolution of insurance: quantitative models of catastrophic loss, experience of catastrophic loss and outcomes of litigated cases. The balance of this paper is devoted to a description of the industry and these modes of learning.

The industry

To the surprise of many, the core business of an insurance company is asset management – not insurance coverage. Insurance companies are important to us because of their underwriting services and indemnification of our insured losses. We are important to them as a source of capital so that they can invest in profitable ventures. For example, even if their insurance underwriting was to pay out as much as it collects, they would have held their clients money for the duration of the contract at a zero interest rate.¹ This is certainly a better deal than borrowing the capital directly. Extending this argument further, it becomes clear that the rate of interest on capital is a driver of insurance companies seeking clients. When interest rates are low, higher risk clients are not courted. The potential loss from a higher risk client may make the underwriting less profitable than borrowing the money from the capital markets. On the other hand, when interest rates are high, the insurance industry will likely accept clients that would otherwise not be considered insurable. The authors believe that feedbacks may emerge between the insurance industry and capital markets in response to significant correlated losses. So far, there is no evidence of such interactions that

¹ This over simplification ignores transaction and overhead costs.

we can point to.

The global insurance industry in 2004 had revenues in excess of \$3 trillions. Overall, 60% of their underwriting is in life insurance.² The industry is considered an exemplar of the science of risk management. This is true for risks involving large numbers of uncorrelated losses (e.g., life, car, fire). However, the ability of the industry to assess and manage correlated, catastrophic and infrequent events is not well developed. This is because extreme events have rarely had a major impact on the bottom line of the industry. The most dramatic impact was following Hurricane Andrew in August 1992, when six insurance providers went bankrupt. But it is important to note these companies were very small in size – their failures only affected 3% of the insured losses (Gallagher 1993). The losses in the wake of the 2005 hurricane season were more than twice as high as Andrew exceeding \$₂₀₀₅100B and only one insurance firm was forced into insolvency. The reason for this more fortunate outcome is not an industry and regulators who have matured in their understanding of catastrophic losses, it is that assets held by the industry were doing poorly in 1994, while insurance company assets held in the run up to 2005 had been highly profitable and largely unaffected by the events.

Event based learning

Historically, extreme events have been the main driver of insurance provision, public-private risk sharing arrangements and insurer regulations. Extreme events have provided concrete evidence that geographic concentration of underwriting is not good practice in risk management. They have also highlighted how some risks are uninsurable.³

Experience from the 2004 and 2005 hurricane seasons have finally persuaded industry to pay attention to their spatially correlated risks. From an onlookers perspective, pride in such market leadership has always been a measure of misunderstanding correlated risks. In May 2006, the US's 2nd largest insurance company wrote to its homeowners policy holders in Long Island NY and many coastal communities in four other east coast states informing them their policies will not be renewed. Their reason what that their leadership position in homeowner underwriting had created too much correlated risk exposure on the US East coast.

Model based learning

The new modelling results have provided insights on the details of loss mitigation by the industry. An important part of any insurance contract is the “deductible” portion of the payout in the event of a loss. Frequent smaller loss claims can accumulate into large sums over time. An important means of keeping insurance affordable, and underwriting less costly is to structure the deductible and premium rate schedules in order to encourage clients to accept a high deductible and save the insurer costs associated with trivial claims. Models have been extremely helpful in generating damage probability surfaces for the quality of construction in building and various

² The pattern of underwriting varies across Europe, Asia and North America.

³ An uninsurable asset is one that faces such a risk that the premiums needed to underwrite that risk are too costly for the owner of the asset.

mitigation measures that homeowners can take. This has led to more refined rate structures, as well as strong model-based evidence for the net benefits of installing storm shutters.

Evidence of model-based learning can be found in MetLife, as part of their homeowner policy renewals, to demand home inspections and insisting homeowners within 5 miles of salt water invest in expensive impact mitigation measures before they renew policies.⁴

To some, such a development may seem callous. To the authors, it is a measure of how the insurance companies can help their clients understand the risk inherent in where they have chosen to live and the measures they need to take in order to have structures more suitable for living under such conditions. Internalisation of a building code that is cognisant of the added risks inherent in building homes on the coast should be part of the municipal building codes, but in its absence is being enforced by the insurer.

Models are also being used by the industry to promote greater awareness of the potential risks. In Europe, an industry-funded effort is underway to provide downscaled daily data for climate change predictions in large metropolitan areas. The tragic loss of more than eleven thousand extra lives in August 2003 has alerted communities to the need for proactive measures. The insurers are using the downscaled data (often extreme plausible data points) to elicit support from the EU, national, and local governments for measures that will increase the coping capacity of cities in the event of future heat-waves.

Learning through litigation

Insurance involves a contract in which the risks and conditions for payment are defined as clearly as can possible. Each event can bring new evidence on how damage occurs or which risks may have been unexpected but present. Insurers in the US (we have not studied practice elsewhere) often seek a clarification of the contract through the legal system. A good example of how the limits of coverage can come to be contested is the issue of separation of wind and rain damage from flood damage. This issue defines the payouts that should be covered by the National Flood Insurance Program and by private insurers in New Orleans. The issue has been accepted for review by the State Court in Mississippi (2006). Their findings may go through a few rounds of appeals and refinement, but will eventually be reflected in newly defined terms of reference for homeowners insurance everywhere in the US.

In much of this paper we have focussed on underwriting homeowner risks due to climate change. Of course, the industry also offers insurance for: business interruption, director liability, etc. Director Liability Insurance has been among the least closely defined forms of exposure. However, director liability may be one of the most potent weapons in the NGO efforts to bring about a greater sense of urgency and action in large energy companies. At a recent workshop, the insurance industry were

⁴ Homeowners insurance in the US only covers wind damage because flood insurance was no longer offered from 1968 onwards. The Federal government has to create the National Flood Insurance Program in order to address insurance company concerns about their exposure to developments in flood zones and an unwillingness on the part of local and federal governments to relocate the effected households or initiate more effective flood prevention measures (Joyner 2006).

asked about their preparation for this eventuality and whether modelling would be a useful approach to inform them of their potential exposure and hence needed revision to the price of and terms of coverage. A prominent insurance association representative responded by stating that they would only learn the true extent of their exposure in a court case. This is an important insight into how model based learning and court based learning help insurers in very different ways.

Institutional setting

The insurance industry operates within a complex institutional framework. At one end, their clients are encouraged to develop risk prone sites by local municipalities in search of growth. At the other end they are under scrutiny by regulators making sure their profits are reasonable and their treatment of clients is fair. They also need a range of financial markets and support mechanisms through which to spread/limit their risks.

Differences in jurisdictional authority have led to a better integration of insurance underwriting and risk avoidance in Europe than in the US. For example, the EU refuses new development funds targeted at areas prone to flooding. This means that the industry will not be directed to provide underwriting in risky areas and forced to cross-subsidize that risk through premiums paid by clients in other locations or other lines of insurance. That is not the case in the US where the local governments have not been willing to limit growth in risk prone areas and have traditionally been reluctant to enforce strict building codes designed to limit damage to structures due to storms.

Over the past half century, newly gained knowledge of major catastrophic event has led to a number of responses at various levels of government and industry:

- a) The industry has tried to limit coverage.⁵
- b) The industry has stipulated better building practices and investment in damage mitigation by the insured.
- c) The re-insurance industry has made reinsurance more expensive.
- d) The State government has tried to force industry participation – e.g., the Florida Property and Casualty Joint Underwriting Association (Gallagher 1993).
- e) The State has formed a publicly funded insurance company of last resort – e.g., the Citizens Property Insurance Corp.⁶
- f) The formation of Federal underwriting provisions – e.g., the National Flood Insurance Program.
- g) The issuance of catastrophe bonds and other financial instruments to share underwriting risks (Jeffee and Russell 1997).

⁵ A good example of the limited coverage is the issue of separation of wind damage from flood damage. The question of who should settle the losses of homeowners who have suffered losses by wind-driven surges is now before the court in Mississippi (2006).

⁶ New legislation in Florida has now excluded homes valued at more than \$1M from participation in this insurance scheme. The State cites high exposure as the reason for not renewing such policies after 2008. The state also notes that owners of high value homes should be able to seek insurance in the private market without suffering undue financial hardship (Joyner 2006).

The current situation is far from ideal because the risks of continuing climate sensitive activities, e.g., farming where there is an ever increasing risk of drought, or building where there is high risk of storms or inundation are not yet internalised.

Appealing to market based mechanisms is not going to solve this issue, because markets soon will learn the extent of their exposure and will either seek assurances against catastrophic losses or refrain from supplying insurance. The government as the insurer of last resort is the best placed to experience internalised costs of risky activity. However, the political price of seeking to limit exposures is particularly high – especially when chances to seek a change in practice often only come about after a catastrophic loss, e.g., not rebuilding parts of New Orleans.

Conclusions

So far, extreme event losses have only dealt a small blow to the industry coffers (less than 5% of their revenues). The evidence from rising exposures and new models estimating the risks quantitatively have only recently come to influence underwriting decisions. It is tempting to assume that this new knowledge is promoting the industry to offer better-informed terms for underwriting. It would be more accurate to say that the industry has learned that that some former underwritings are simply uninsurable. This will eventually lead to a renegotiation of risk management through a better coordination of private and public entities. However, while insurers in Europe enjoy a cooperative relationship with local, national and EU governments, deep tensions characterise the industry-government relations in the US.

With each passing event we are learning more about the magnitude of risks due to climate change. Our ability to address catastrophic loss of life has been well demonstrated with cyclones in the Bay of Bengal taking now only taking a few thousand lives instead of hundred of thousands of lives. However, the damage to infrastructure from such events can easily overwhelm the treasuries of small countries. In the event of less well-developed infrastructure, even small, much more frequent, events are likely cause of significant business interruptions and hinder economic development. The overall losses from retarded economic development dwarf losses from extreme events. So, capacity building for micro-insurance for business interruptions and support for more robust infrastructures are the most effective means of ameliorating the impacts of climate change in developing countries. The provision of such a service has the potential to create far greater benefits than indemnifications in the case of extreme climate events given the current paucity of support for international compensations.

In countries where the insurance industry is well established, climate concerns are forcing a more careful examination of underwriting practices in general. This will reduce the avoidable risks faced by the industry and make it more capable of meeting the needs of their clients. The public clamour for the industry to have its feet held to the fire may force an eventual resolution that engages public entities in limiting development/activity where risks are simply too high. This recognition that many such risks are created by our own lack of foresight will entail significant public benefits.

Bibliography

- John Tuepker and Claire Tuepker v. State Farm Fire and Casualty Company* (May 24, 2006), Mississippi, Civil Action No. 1:05CV559 LTS-JMR (The United States District Court, Southern District of Mississippi, Southern Division), online: <<http://www.courthousenews.com/katrina1.pdf>>
- Gallagher, T. (1993). Hurricane Andrew's impact on insurance in the state of florida, *The Florida Department of Insurance*: 43.
- Jeffee, D. M. and T. Russell (1997). "Catastrophe insurance, capital markets, and uninsurable risks." *The Journal of Risk and Insurance* **64**(2, Symposium on financial risk management in insurance firms): 205-30.
- Joyner, R. (2006). New law will bar million-dollar homes from insurance of last resort. *Scripps Treasure Coast Newspapers*.