The link between greenhouse gas emissions and the effect on world climate is now scientifically accepted. In the past few years in particular, unstable and extreme weather patterns are occurring globally. Of particular concern is the melting of the Antarctic ice caps which are predicted to cause a rise in sea levels threatening the existence of many inhabited islands and coastal regions around the world. Australia has experienced an unprecedented lengthy drought which has seriously affected food production.

Greenhouse gas emissions have risen dramatically over the past 20 years due to the world thrusting ahead with economic development. China and India in particular have added to the rise in CO2 emissions due to rapid economic development and the need for energy obtained from the use of fossil fuels. In 1998 world wide carbon dioxide emissions amounted to 22 848.00 metric tonnes of CO2-e whereas in 2004 CO2-e emissions had risen to the unprecedented level of 27 043.57 metric tonnes.

Extreme weather patterns are causing and will continue to cause major property damage and the question of who pays is becoming a serious issue for insurance companies and governments alike. The questions addressed in this paper are twofold:
1 How does climate change affect the insurance industry where historically people who have suffered loss, have relied upon insurance for financial support?

2 As climate change has introduced an era of instability, can insurance companies offer innovative solutions to a crisis of this nature?

In 2005 devastation on an unprecedented scale was caused by Hurricane Katrina in New Orleans. Insurance companies struggled to cope with the fallout of claims that resulted from the massive damage that ensued. Even though the damage caused by Hurricane Katrina was greater than that inflicted by the 9/11 terrorist attack, government policy failed to provide similar financial protection in the event of natural disasters.

Australia is particularly vulnerable to rising sea levels because its population is situated mainly on the coast due to the continent’s harsh and hot inland climate. Individuals, companies and entire industry sectors now need to consider liability issues that are likely to result from the repercussions of climate change. Historically, insurance companies have coped with the financial damage resulting from serious weather events. However a new approach to insurance needs to be undertaken that prevents insurance companies from being dragged into insolvency in the event of a climate disaster. At the same time the protection of affordable and accessible insurance policies must be available. A new question that has arisen is what role the government should play in an ensuring private/public partnership.

This paper explores strategic responses from the insurance industry to climate change risks. The paper argues that the current methods of calculations and instruments are redundant and insurance companies now need to prepare not only themselves but also the general public and the government for an environment in which there are heightened risks. New methodologies need to be developed sooner rather than later in the context of adaptation to the risks and realities of fighting climate change.

I INTRODUCTION

A Framing the Insurance Debate

It is ironic that, whilst writing this article, Sydney and parts of the eastern coast of NSW endured a sustained period of violent storms. The damage to vast numbers of homes and businesses was a salient reminder of the vulnerability that characterises society’s relationship with nature. The figures produced by various government and insurance bodies highlighted the loss incurred and the funds promised through post aid relief. The damage caused by the effects of severe weather events results in a process of loss, calculation of damage and restoration and is viewed as an automated process. Even though the magnitude of the figures concerned run into millions of dollars, appreciation of this risk is undermined by a tendency to see the
Financial Adaptation Challenges for the Insurance Industry due to Climate Change

In this paper the authors argue that insurance has a core role to play in preferable climate change strategy and regulation. Governments need to utilise the benefits of the insurance industry in the fight against climate change as much as the insurance industry requires an effective government strategy in order to remain solvent. Insurance is part of the overall policy of adaptation – in particular financial adaptation. In essence, adaptation is aimed at reducing the severity of many impacts that could result from climate change if current adverse conditions prevail. The PEW Centre\(^4\) states that adaptation is ‘particularly important given the mounting evidence that some degree of climate change is inevitable’.\(^5\) Adaptation is a strategy that focuses on building defences against changes that are likely to occur. It is often compared to mitigation, a strategy which takes a longer term view of reducing the conditions that foster global warming and climate change thereby reducing the risk of extreme weather occurring in the first place. Adaptation tends to be a strategy that is often overlooked or treated with disdain by those who believe adaptation simply distracts people from the real problem of reducing greenhouse gas emissions.

Climate change, or to be more precise, the weather related consequences of climate change, present challenges that threaten fundamental assumptions about the risks of extreme weather damage. Recent events in Australia have revealed that people are now exposed to extreme weather events. Of particular concern is the lack of financial preparation and safeguards to counter the risk of extreme weather events. Following the NSW storms, the Insurance Council of Australia highlighted the problem of underinsurance and in some instances a lack of insurance, in the country.\(^6\) The Council argues that the consequences of this trend has resulted in many policy holders becoming bankrupt as a result of underinsurance despite the fact that 19 of the 20 largest property losses in Australia over the past 40 years have been weather related events such as Cyclone Larry in 2006.\(^7\) The total cost of claims due to the storm damage is expected to exceed AUD 750 million.\(^8\) Such an outcome shows that inadequate financial measures have been taken despite the risk. In an era of climate change the dangers associated with these vulnerabilities will be exacerbated, a key issue is whether the required impetus will be injected into policy to deal with future financial consequences.

---
\(^4\) The Pew Centre on Global Climate Change brings together business leaders, policy makers, scientists, and other experts to bring a new approach to a complex and often controversial issue <http://www.pewclimate.org/> 14 July 2007.
\(^8\) Ibid.
As climate change is a global issue, the question of financial preparedness pervades relevant policies and strategies of all nations. Whilst an individual nation’s response will be tailored to meet certain dangers and conditioned by different budget levels and political concerns, an analysis of the approach taken by developed countries to the problem is vital.

The financial fallout of the recent weather related events in Australia, and the intense flooding experienced in regions of the United Kingdom in 2007, must be viewed along with the events that followed Hurricane Katrina in the United States of America in 2005. The insurance industry was thrust into the forefront of the climate change debate following the cataclysmic financial damage caused by Katrina. In terms of financial damage the privately insured losses alone are estimated to be between USD40 – 60 billion.9 The total damage bill has been measured at over USD200 billion with an additional USD100 billion spent by the federal government on recovery programmes in affected states.10 It represented a cross roads for the industry: it could integrate itself into climate change strategy and policy or withdraw from the area of natural catastrophe risk in the face of oblivion. Whilst the financial consequences of Katrina will be discussed in greater length in due course it is useful at this juncture to underline the major repercussions for the insurance industry that eventuated. Katrina has been branded the ‘costliest insured loss in US history’.11 A number of insurance companies withdrew policies that were previously offered in affected regions.12 In the aftermath of Katrina the insurance company Allstate withdrew cover for properties located near the Gulf of Mexico. It is also interesting to note that similar consequences followed the Florida hurricane season of 2004. The following year Allstate cancelled 95,000 homeowners’ policies in Florida. Allstate maintained that the inadequate rate produced by the regulated system used in Florida was a factor in the decision not to renew 120,000 policies in the state.13 Areas from southern Texas to the Maine are affected by the attempts of insurance companies to reduce the risk of major hurricane-related payouts. Some companies faced the possibility of having their ratings downgraded by insurance regulatory bodies whilst other companies simply collapsed under the pressure of paying claims made by policy holders and were declared insolvent.14

The legacy of Katrina, at least in the context of insurance, is that an event of such magnitude has the capacity to wipe out the reserves of a company. Industry research indicates that whilst almost all rated companies will be able to meet their commitments following Katrina this might not be the case in the future. Since 1989

---

10 Ibid 4.
11 Ibid 2.
13 Ibid.
and the damage inflicted by Hurricane Hugo, USD1 billion disasters have become relatively well managed.\textsuperscript{15} However industry representatives agree that a probable maximum loss event, USD120 billion in damage, striking the Gulf and Atlantic Coasts could exceed the total capacity of the US insurance industry.\textsuperscript{16} Reinsurance is also becoming more expensive. Some reinsurance companies are based in Bermuda and Europe making them exempt from US pricing regulations.\textsuperscript{17} However the pressure to keep the price of premiums down is also problematic. Robert Hartwig of the Insurance Information Institute believes suppression of rates has meant that sufficient cover has not been provided and companies have been forced to pull out.\textsuperscript{18} The prospect of millions of dollars invested in both private commercial business and public utilities literally being swept away in a catastrophic storm, does not lend itself to confident financial forecasting.

The history of the insurance industry demonstrates that in the face of catastrophic and perhaps unprecedented loss, both natural and man-made, insurance can provide the means to restore things to their previous condition and also insulate vulnerable groups from external risks. Insurers have historically adapted to change, however the quandary of insurance in the context of climate change is that the environment is constantly changing and different permutations of the impact and damage are influencing our understanding of risk.\textsuperscript{19} This is a handicap for the insurance industry as it undermines its capacity to identify and assess risk effectively. The insurance industry has managed and pacified risk because it has been able to assess risk in relation to key reference points and build a policy framework around it. Yet in the face of such unpredictable and rapid change it will be become increasingly difficult to determine weather related risks with the result that climate change represents a new frontier for the insurance industry.

B The Regulatory Role of Insurance

Adaptation and mitigation, particularly financial adaptation, are complementary strategies with different but equally important roles to play. The overall aim is to ensure that a coordinated and comprehensive strategy that addresses the problems of climate change is implemented. With this in mind, it is necessary to identify not only relevant instruments or tools but also the different actors and how they interact.

A comprehensive strategy of adaptation shares some elements with functional approaches to regulation also referred to as a ‘cybernetics perspective’.\textsuperscript{20} This well

\textsuperscript{15} Congress Research Service Department, above n 9, 8.
\textsuperscript{16} Congress Research Service Department, above n 9, 8.
\textsuperscript{17} Simons, above n 12, 3.
\textsuperscript{18} Simons, above n 12, 3.
known approach is relevant to the present article because it focuses on the capacity for influencing social behaviour that is a perennial concern of environmental policy and regulation – especially in relation to adaptation. Whilst not all operations of this approach are applicable, its basic framework is a useful explanatory tool.

Participation in a policy of adaptation must receive financial and regulatory encouragement. In order to enlist the help of the insurance sector, governments must make policy viable for the involvement of the insurance industry. Given the expertise of the insurance industry in translating information into risk evaluation, it is in the most advantageous position to proactively manage risk on a long term basis. This is preferred to the current system of government disaster relief for two principal reasons:

1. it will increase business confidence in relation to given risks
2. whilst government continues with post event relief payments adaptation will not be encouraged and if extreme weather events become more frequent government costs for post disaster repair will spiral to the point where budgetary resources are outstripped by the needs for assistance.

This is fiscally irresponsible and simply unsustainable.

Hood, one of the leading exponents of the functional regulatory approach, states that any control system must consist of three components:

1. a capacity for standard setting;
2. information-gathering or monitoring to produce knowledge about the current of changing status of the system;
3. some capacity for behaviour modification to change the state of the system.\textsuperscript{21}

Whilst some observers might insist that these three functions should be fulfilled by one body or actor in the context of climate change, we argue that such an approach is out of touch with reality. These components can easily be aligned to different actors in the climate change policy area and gives a useful overall view of their interaction.

‘Standard setting’ is represented by the climate change goals and objectives established by law, policy etc.\textsuperscript{22} Presumably these ambitions will be set by government through instruments such as legislation and/or ordering mandatory disclosure of carbon related activities. Leadership of this kind creates awareness, an essential prerequisite when trying to influence behaviour and instil an appreciation

\textsuperscript{21} Ibid 3.
\textsuperscript{22} Ibid 3.
of the risk presented by climate change. Managing and regulating climate change related risk relies heavily upon the availability of accurate, relevant and updated information. Therefore information gathering is vital to produce knowledge about the changing nature of weather patterns attributable to climate change.

Insurance revolves around its core strength of risk identification and assessment. Without recourse to the proper information, this ability is lost and the insurance industry is impotent. In order to include the insurance industry in its climate change strategy, governments must ensure that the necessary resources are made available to provide climate change modelling services. Information gathering is just one instance of the intersection between government policy and the insurance industry. Another example is the capacity for behaviour modification, the third component of the regulatory approach. This is where insurance plays a pivotal role in the adaptation strategy.

Policy adaptation needs to provide a number of incentives in order to be effective. Currently victims of the effects of climate change catastrophes rely strongly on post disaster payouts which are no longer viable as the experience of severe weather activity escalates. The Intergovernmental Panel for Climate Change (IPCC) noted in its report on mitigation that ‘social and behavioural issues are a major constraint on action to reduce carbon emissions’. By linking financial security to environmental planning, the effect of climate change insurance is a powerful leveraging tool. The underlying challenge of adaptation to climate change is to ensure that what are considered to be losses from extreme weather events do not become regarded as the norm. The logical, if somewhat extreme conclusion, is that if society or a particular community fails to adapt to climate change and damage becomes the norm there will be no “non-victims” and everyone would be responsible for their own damage. Insurance will simply no longer be an issue.

A public-private type policy is required to reinvigorate the role of insurance in adaptation to climate change. The different perspectives and interdependence of the three key stakeholder groups

(a) the government
(b) private insurance industry, and
(c) affected communities and businesses

are analysed to bring into focus how best these groups can act in concert when combating and adapting to the effects of climate change. The underlying theme is that relief efforts which rely on post disaster pay outs are no longer viable.

The paper begins by briefly couching the debate in terms of the scientific evidence and the recent devastation caused by extreme weather events. The focus is upon the

---

damage caused by Hurricane Katrina in 2005 and how it has altered society’s perception of ‘risk’ in relation to extreme weather damage. That episode served to highlight not only potentially stronger weather patterns but also society’s inherent vulnerability to damage.

Following that analysis, the paper examines the ideas of adaptation and mitigation, two related concepts which pose questions of how best to combine the two and to what extent the strategies are mutually beneficial. The analysis of adaptation will provide the framework for discussing the role of insurance. The key issue is discovering what role insurance can realistically fulfill and whether it can help change behaviour.

We argue in this section that whilst in principle insurance is pivotal, changes must be made in order to make the protection offered by insurance more affordable and available to cover certain specified risks. Assessments will be made of some innovative programs, where insurance policies are reaching previously untapped markets and offering protection to risks that were otherwise perceived as ‘uninsurable.’

The issue of efforts to overcome problems of affordability leads to the argument that in order to capitalise upon the opportunities that new insurance products create, governments must take a more interventionist role in helping to create a healthier environment for such markets. This has occurred under the banner of ‘public private partnership (PPP)’. As part of our analysis we take a comparative look at some state based insurance schemes around the world, such as the US, with a particular focus on how these schemes create incentives and encourage adaptation through primary insurance and reinsurance.

This issue of reinsurance addresses the question of why most developed countries do not provide state based mandatory insurance schemes for natural catastrophes; they have legislated to provide some form of terrorism related insurance.24 In most cases, such as in Australia, it effectively takes the form of reinsurance.25 This example of ex ante insurance should also be utilised in relation to natural disaster risks through similar legislation. Such an insurance structure will increase liquidity of funds and more importantly will encourage, and in some cases coerce people, to undertake adaptive and mitigating steps.

Finally, this paper reviews some of the government initiatives aimed specifically at adaptation and adaptive capacity. In 2007 the Australian federal government announced that a percentage of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) budget will be channeled into creating a research facility devoted to adaptation.26 This section will examine the role of insurance in

---

24 See for example the 
25 *Terrorism Insurance Act 2003 (Cth).*
27 *Terrorism Insurance Act 2003 (Cth).*
these programs and whether they will give the necessary impetus to spark the private market.

C The Unpredictability of Dangerous Global Weather Patterns

Recent weather extreme events have heightened public awareness of climate change. The Report on Climate Change released by the IPCC in 2007 confirms that global warming increases the frequency of extreme weather events.\textsuperscript{27} It is impossible to attribute specific storms or hurricanes directly to climate change. However the increase in conditions that cause extreme weather means that storms, hurricanes and floods will become more frequent and volatile. The heightened vulnerability to this risk is the result of a combination of natural and man made factors. Whilst anthropogenic contribution to climate change is a well documented issue, trends such as growing populations in hazardous geographic zones and poor maintenance of infrastructure tend to be overlooked.

Since 2005 extreme weather events tend to be viewed as occurring in a ‘post-Hurricane Katrina’ world. Such was the magnitude of the hurricane and the consequent damage that governments and the private insurance industry have been forced to overhaul traditional views on insuring natural disasters. In terms of economic damage it was one of the most devastating single episodes in US history. Katrina and other hurricanes only represent a portion of the overall damage from extreme weather events. It is unhelpful to argue that Katrina and other extreme weather events are simply the result of global warming, however it is certain that given the increased likelihood of extreme weather events and the continued preference for populations to live near the coast, society is undoubtedly becoming more vulnerable to the effects of climate change.

Planning by insurance companies for extreme weather events is impossible due to unpredictable timing and the ferocity of them. The ability to appreciate risk is the first step when considering whether the insurance industry can withstand a natural catastrophe onslaught. The figures outlining the financial impact of Katrina emphasise why the insurance industry is urgently attempting to rationalise its role in relation to climate change. The Stern Report lists the damage at USD 125 billion in economic losses – of which USD45 billion was insured through the private market and USD15 billion through the state based National Flood Insurance Program\textsuperscript{28}. Overall Katrina caused 1,300 deaths and over one million people were displaced as a result\textsuperscript{29}.


\textsuperscript{28} The Stern Review, PART II: The Impacts of Climate Change on Growth and Development, 5 Costs Of Climate Change In Developed Countries (2006) 11.

\textsuperscript{29} Ibid.
As part of a survey on hurricanes, the insurance company Guy Carpenter noted that the 10 most costly hurricanes in history occurred over the period 1996 – 2006, with seven of those occurring between the years 2004 – 2006. Additionally over 50% of the financial damage caused by Hurricane Katrina’s has ceded to reinsurance companies thereby spreading the costs of the disaster across global markets. The composition of damages is infinitely complex because property damage causes unemployment and loss of production. Furthermore, aggregating costs across countries is difficult due to different levels of exposure to risk and varying vulnerability. This includes relative values such as culture and standards of living.

1 Australia’s Vulnerability

Australia is vulnerable to extreme weather risk. Whilst there has not been a single event to compare to the magnitude of Hurricane Katrina, a number of events and trends certainly underline Australia’s precarious position. The majority of Australia’s population lives in coastal regions and is exposed to extreme weather such as storms and flooding. Cyclone Larry in 2006 exploited this vulnerability and it certainly serves an interesting basis to draw comparisons to the experience in the USA.

Cyclone Larry developed in the Coral Seas and hit the Queensland coast in March 2006 causing economic damages estimated to be in the region of USD1.1 billion though only USD400 million of that was insured. There was extensive damage to thousands of buildings and the banana and sugar industries were decimated. Officials were of the opinion that the cyclone was unusual because the damage reached 200kms inland. Peter Cowell, a marine scientist believes:

Cairns already faces the sort of risk that New Orleans faced. It’s a tropical cyclone belt and it is all low lying … if a category three cyclone comes through here there’ll be serious flooding and damage.

Cyclone Larry was measured as a category three event and considered a ‘moderate insurance event’. However when the potential damage of such an event is coupled with Australia’s continued preference for coastal living serious questions about the future of those living on the coast are brought into question. The north coast of NSW and the south coast of Queensland are popular areas for development. Most

31 Ibid 4.
33 Ibid 20.
34 Ibid.
36 Ibid.
are found in low lying areas prone to extreme weather damage and flooding. Some observers in Australia (7:30 Report/Climate Risk) believe that ultimately properties in south east Queensland might follow trends in the USA and become 'uninsurable'.

Storms remain the costliest weather catastrophe in the developed world. The frequency of intense storms is likely to increase as sea levels continue to rise. Rising sea levels mean that the cost of flood defences and insurance premiums will rise. The CSIRO has reported that a rise in sea levels accompanied by a 1-2 degree increase in temperature will result in higher storm surge events across Australia's east coast. Some estimates also predict that a one metre rise in sea levels will affect an area of 140 000 kms from the coast.

Despite society’s appreciation of the vulnerability of coastline living, effective management of risk is difficult as climate change assessments are blighted by uncertainty. Lloyds of London in a recent report on the climate change debate and the role of insurance stated, ‘This creates uncertainty and that in itself means greater risk’.

D Climate Change Risk

This heightened sense of unpredictability has been confirmed in the Fourth Assessment Report released by the put in full Intergovernmental Panel on Climate Change (IPCC) in early 2007. The Working Group confirmed that:

… the type, frequency and intensity of extreme events are expected to change as Earth’s climate changes, and these changes could occur even with relatively small mean climate changes.

Furthermore the Report, using new modelling techniques, has confirmed that increased temperatures could result in more frequent tropical cyclones (hurricanes) with greater wind speed and precipitation. Evidence also suggests that parts of Asia and the Pacific will be increasingly vulnerable to flooding during more intense
monsoon seasons. Insurance companies agree that the challenge of climate change requires ‘forward looking’ policies not only in terms of cover but also to ensure that the insurance companies themselves remain viable.

Insurance must become a more effective risk management device. A key to reducing risk in vulnerable areas is adaptation through which insurance can play a pivotal role. There are examples of communities in coastal Australia that have adopted adaptation measures. A good example is Byron Bay on the NSW east coast where a planned retreat policy is proposed. The plan has been on the books since 1988 after heavy storms a decade earlier had destroyed large tracts of land. The basis of the plan is to set erosion zones several hundred metres behind the current line of sand dunes. Additionally, new buildings in the area will be designed so that they could be disassembled within 24 hours and moved in the event of a cyclone or flooding. Very simple measures can be employed to reduce damage and aid adaptation such as securing roof trusses. The Stern Review states that property-owners around the Gulf of Mexico who:

implemented all the recommended hurricane protection methods suffered only one-eighth of the damages from Hurricane Katrina than those that did not implement such methods. The result was that investment by property-owners of USD 2.5 million avoided damages of over USD 500 million. This is a prime example of cost-effective adaptation.

However this is little confidence that the lessons of Katrina have been heeded. Statistics provided by the Insurance Information Institute show that only about 30% of homes in Louisiana were protected by flood insurance. Whilst mortgage lenders required homeowners to buy such insurance there is no monitoring system to ensure coverage is maintained. According to the Army Corps of Engineers responsible for the reconstruction of levee walls in New Orleans, the city remains as vulnerable to another disaster on the scale of Katrina. The construction is designed to repel a 1-in-100 year storm but this is substantially less protection than is required to withstand a 400 year event like Katrina or a category 5 hurricane. It underlines the important role of adaptation in trying to reduce the vulnerabilities of coastal property to the risks associated with extreme weather.

44 Ibid 751.
46 Ibid.
48 Congress Research Service, above n 9, 7.
1 Adaptation as a Climate Change Strategy

Adaptation is a risk management strategy. The idea of risk management is built into international legal instruments such as the United Nations Framework Convention on Climate Change (UNFCCC).\(^50\) Though the specific instrument of adaptation is largely absent from the UNFCCC, it appears in Article 4.1(b) of the UNFCCC which states,

> All Parties shall formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change.\(^51\)

In this article one of the major issues focused on so strongly is challenging the misconception that mitigation can provide the necessary reductions or stabilization required to avoid all adverse consequences of climate change. There are limits to what mitigation can actually achieve. It is also a reality that some adverse consequences are inevitable and these risks must be countered.

The standard definition of adaptation endorsed by the OECD is:

> Any adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities.\(^52\)

The key problem for measuring and assessing adaptive capacity in the context of climate change is the inherent uncertainty of extreme weather patterns. Risk management ‘utilises a formalised set of techniques for managing uncertainty’.\(^53\) The main purpose of risk assessment is to determine the need for risk management.\(^54\) The object of adaptation is to reduce vulnerability to climactic change and variability, thereby reducing their negative impacts. The CSIRO argues that, ‘adaptation can expand the range of climate variability with which a system can cope, while mitigation reduces the upper limit of climate change to which a system will be exposed.’\(^55\) In order to understand risk these relevant vulnerabilities and their potential to be exploited must be analysed.

---

\(^{50}\) See <http://unfccc.int/2860.php> 23 August 2007.


\(^{54}\) Ibid 137.

\(^{55}\) Preston and Jones, above n 55.
Adaptation must be viewed in conjunction with other policies. It is not intended to be replacement or alternative for mitigation but merely complementary. The PEW Centre put this in full maintains that:

Adaptation actions and strategies present a complementary approach to mitigation. While mitigation can be viewed as reducing the likelihood of adverse conditions, adaptation can be viewed as reducing the severity of many impacts if adverse conditions prevail.56

Other key terms relating to adaptation include:

- ‘vulnerability’ – a measure of a system’s susceptibility to climate change, which is a function of the system’s exposure, sensitivity, and adaptive capacity;
- ‘Exposure’ – the degree to which elements of a climate-sensitive system are in contact with climate;
- ‘Sensitivity’ – the degree to which a system can be affected by climate change without accounting for adaptation.57

The Stern Report, building on work undertaken by the UK Climate Impacts Programme, notes that adaptation functions on two levels:-

1 building adaptive capacity
2 delivering adaptation actions.58

Risk spreading is considered to be a key element of adaptive capacity and the ability of systems to respond to changing environments. We consider that the optimal role for insurance is to bridge these two operations. In order to remain relevant the insurance industry must widen their understanding of risk. This includes improving access to current scientific information and anticipation of climate change impacts which are key elements to building capacity. The appreciation and knowledge of risk gained by insurance companies can then be used as the basis for new insurance. Compulsory actions such as flood defences will be mandated in order to trigger the financial protection offered by a particular policy. By linking adaptive actions to financial instruments insurance has the capacity to ‘price’ carbon, or more precisely, place a price on activities which increase the chances of loss from climate change risks.

The strategy outlined by the United Nations Environment Programme (UNEP) includes adaptation in the context of sustainable business development. The logical conclusion therefore is a relationship between insurance facilitating sustainable business practices. UNEP states, ‘a fundamental new dimension is emerging: the need to integrate adaptation policies with policies for sustainable economic development … to achieve a “triple dividend” from scarce resources’. This requires close cooperation between the insurance industry and planning priorities. The UNEP Report identifies three steps in this policy of forward commitment:

- Identification of climate sensitive areas that feature capital assets;
- Analysis and strengthening of ‘adaptive capacity’. This includes a number of aspects including access to information, finance and strong regulatory framework;
- Decisions must be made on a cost/benefit basis – it is impossible to do protect all risks and lead an unchanged lifestyle. Some losses could be unavoidable.

Insurance plays a significant role because it helps ‘mainstream climate change’ through integration. Insurance permeates most activities – provided of course that it can remain both affordable and accessible. Interestingly though adaptation and insurance also exist as part of a co-dependent relationship. Whilst insurance can play a major role in adaptation efforts, adaptation is required to ensure that the insurance industry remains viable. The UNEP commissioned Andlug Consulting to produce a forecast detailing impacts on the financial sector in adaptation measures were not undertaken. The forecast is based on ten year periods and demonstrates:

- Decade to 2025 – some big markets will be uninsurable;
- Decade to 2035 – limited capacity for property insurance;
- Decade to 2045 – some insolvencies.

If the benefits of insurance are to be realised, adaptation must be proactive rather than reactive. This is a particularly important distinction to make in the context of a perceived role for insurance. Insurance must attach conditions to policies which ensure its own survival and viability whilst also promoting proactive adaptation. This is consistent with the overall purpose of insurance to try and minimise risk if possible on a long term basis. Similarly, adaptation is a race against time. The measures required to adapt to change depend upon the rate of change and must

---

60 Ibid 9.
61 Ibid 9.
62 Ibid 16.
63 Ibid 16.
develop accordingly: if climate change occurs at a more rapid rate, investments in infrastructure will need to occur rapidly.

This reinforces the importance of accurate and relevant information to long term planning. As a form of risk management, adaptation relies heavily upon risk assessment. For example insurance rates are ‘driven by actuarial tables and probability estimates which heavily depend on information and knowledge gained from government agencies’. This is greatly undermined by the levels of uncertainty in assessing future climate change risk. Adaptation must be based upon an understanding of current climate risk. It is important that any adaptation efforts are based upon accurate and up to date scientific information. Given the unpredictability of weather patterns conditions could accelerate at any time and adaptive measures must keep pace.

Adaptation has been described as a ‘bottom up approach’ meaning adjustments to the changes presented by climate change can be initiated at local, community levels. Often governments will devolve some responsibility to individuals or communities but this can only occur where the information regarding the risk is very clear and the adaptive operations are relatively simple. Arguably, the most problematic barrier to this autonomous, dispersal of responsibility, is whether individuals can be relied upon to take consistent and coherent action to adequately share the risk of a common problem. Moral risk and anti-selection are issues that will be examined more closely at a later stage in this paper but at this juncture it is important to mention the individual failure to bear the responsibility for risk. This issue seems to resonate with observers of extreme weather damage. In the US, a report drafted by the Wharton Centre for Risk Management and Decision Processes, found that residents in hurricane prone areas of the country were reluctant to invest in protection measures because they did not see the benefit in paying for risk prevention.

Despite information or education campaigns, problems still exist with regard to motivating people to take responsible measures to reduce risk. Measures such as improvements to infrastructure are generally seen as the responsibility of governments; however it is important that people recognise the limitations of available financial protection. Insurance must attach conditions to policies that ensure its own survival and viability whilst also promoting proactive adaptation. A study initiated by the Wharton Centre for Risk Management and Decision Processes examined the extent to which adaptation and mitigation measures are actively pursued by property owners. Overall the study found that homeowners do not

---


66 Ibid.
invest in financial property protection of their own accord. The reasons help highlight some of the important themes of this paper and considerations for the insurance industry including:

- Property owners fail to recognise the tradeoff between spending money now and the future benefits;
- Lack of information means that knowledge of financial adaptation is low;
- Underlying feeling that government relief efforts ultimately provide a financial safety net;
- Lack of finances with which to buy insurance premiums.

The study also highlighted the importance of PPP. Many insurance companies failed to include adaptation or mitigation measures as part of their policies because state regulations do not allow premium prices to adequately reflect risk. The authors suggest that insurance companies in conjunction with government must lead the way through initiatives such as tying lower deductibles to adaptation or mitigation measures, enhanced building codes and broadening protection against catastrophic loss through the release of new funds.

**E Challenges for Insurance**

The primary challenge for insurance is to provide markets that respond to climate change information, including responses from and reactions to carbon related liabilities or have failed to reduce risk.

Evan Mills states ‘The availability and affordability of insurance are grist for economic development and the financial cohesion of society’ this statement is supported by the fact that the world insurance market is currently estimated at USD 200 billion and given the amount of damages associated with Katrina it is easy to see how fragile it actually is.

The immediate reaction within the industry was to insulate insurance from the uncertainty associated with climate change. Rating agencies very quickly downgraded a number of underwriters. In terms of developing a solid platform from which the industry can insulate itself from future shocks, it is widely believed that more events of the magnitude of Katrina will result in insurance contract exclusions thereby placing the burden back on governments and ultimately...
taxpayers. The relationship between insurance and adaptation is important also because the private economy is obviously dependent upon public infrastructure.

Insurance can be seen as a form of market based regulation of risk comprised of three key behavioural effects:

1. reducing green house gas emissions;
2. moving out of harms way;
3. limiting the damage already incurred and minimise potential future damage.

As part of the fight against climate change, insurance must be both available and affordable so that the most vulnerable sectors of the community can take advantage of its protection. In a rather cruel irony it is often the case that the people who can least afford protection – including comprehensive insurance cover – are exposed to loss and damage. Statistics provided by the Brooking Institute shows that in New Orleans more people were below the poverty line in areas flooded by Hurricane Katrina than in non flooded areas.73

The industry’s core function of risk identification and assessment remains historically based, that is future risks are understood in relation to past occurrences. This reliance on traditional methods means that there is little appreciation for the severity of current and future events and as a result society is under prepared to deal with the loss and damage when it arrives. This outcome is primarily the result of poor information flows and a failure to utilise information on climate change risk.

In order to ensure the inclusion of insurance in any adaptation strategy, it is necessary to create the conditions where insurance companies feel that risk is being evaluated and respected. This idea has been dubbed the ‘Standards of Insurability’.74 Put simply it means that criteria intended to assure the financial survival must be fulfilled before the insurance company will consider a certain risk to be ‘insurable’.75 While insurance has a role to play in financial adaptation to climate change, the insurance industry itself must learn to adapt. Insurance and adaptation can exist in a mutually reinforcing policy. For example, coupling insurance to strategies such as renewable energy can result in lower green house gas emissions but also reduces the risk of power outages and business interruption. Also, deductibles can be attached to policies where homes or businesses are located close to coastlines or other vulnerable areas.

73 The Brookings Institution ‘Hurricane Katrina – Where Do We Go from Here?’ 8 September 2005 – The Brookings Institution also notes that 95% of families below the poverty line were African-American, 33.
75 Ibid 10.
Climate change intersects across a wide variety of different insurance lines. This is because climate change and extreme weather events present a number of contemporaneous or co-variant risks. This strikes at the insurance industry’s ability to aggregate risk and in doing so deliver on its promise of reducing moral risk.\textsuperscript{76} Catastrophes generally mean that aggregation of risk is difficult because large numbers of people are simultaneously exposed to the same peril.\textsuperscript{77} In order to be effective, insurance aggregates uncorrelated risk but this has become difficult given the magnitude of the damage caused by extreme weather events. A technique employed to overcome this is the ‘segregation of risk’. Natural catastrophe insurance policies have often been criticised because low risk and high risk insured people are not distinguished. It leads to a situation where low risk insured people are effectively subsidising people who are at higher risk and suffer risk on a more regular basis. In order to overcome this undesirable outcome premium rates should be charged that ‘most accurately reflect’ the risk an insured brings to a pool, such as people who live in flood prone areas or coastline regions. Conversely, those as lower risk are offered premiums at a reduced rate and avoid the risk of adverse selection.\textsuperscript{78}

\textbf{E The Problem of Relying on Past Events}

This underlines the ability of the insurance industry to influence and change behaviour. Conditions that encourage this uptake are most prevalent following a catastrophic event. History has shown that the aftermath of extreme weather events results in an upsurge of demand for insurance. In a future affected by climate change the correlation of various types of losses and the aggregation of damage from storms, floods rather than specific events will have a larger impact upon the insurance industry. Coupled with the unpredictable rate of change that could result from global warming, this shows that insurance companies must dispense with basing future risk on past historical events. The result of this attitude has been seen in miscalculations: not fully appreciating risk and consequently under investing in disaster preparedness. The combined effect of increased losses, pressure on reserves, inflation of construction costs following natural disasters and rising costs of risk capital will result in years which the insurance industry is not profitable. Similarly the pressure of increasing, more costly claims, can lead to smaller firms suffering insolvency. This often occurs where the government supervision and regulation is weak and poorly enforced. On the other hand, where regulation is more stringent, some insurance companies have had their credit rating downgraded.

It is widely acknowledged that the insurance industry must do more to help actively manage climate change risk.\textsuperscript{79} The Association of British Insurers sees the role of

\textsuperscript{76} P K Freeman and K Scott, commissioned by the OECD, ‘Chapter 12 – Comparative Analysis of Large Scale Catastrophe Compensation Schemes’ in \textit{Catastrophic Risks and Insurance} (2005) 192.
\textsuperscript{77} Ibid 193.
\textsuperscript{78} Ibid 194.
\textsuperscript{79} Lloyd’s 360 ‘Risk Project 1 Catastrophe Trends’ 4 \textlangle www.lloyds.com/360\textrangle 17 May 2007.
the insurance industry as bound to the nature of climate change. Insurance companies are the ‘messengers’ of emerging change and ‘have a key responsibility in helping their customers and public authorities to identify how risks can be managed, reduced, and where possible averted’. Insurance systems themselves are almost as wide and varying as the effects of climate change. Different liabilities and risks will have a greater degree of gravity depending on geographic location, quality of infrastructure etc.

In order facilitate a well functioning insurance industry it is important that the market price is free to price risks adequately. An example of this is the concentration of high priced, high risk properties on the coast. It is vital to ensure that the industry remains robust and flexible in the face of potentially increasing risk. It is assumed that the effects if climate change will occur smoothly and take place gradually. This is a misconception as changes can occur abruptly and the pace of change could accelerate over time. The key is to accommodate climate change unpredictability. Modeling systems used for identifying and measuring risk must be regularly updated. The overall goal is for a long term view of climate change stability. These factors underline the need to move away from basing risk assessment and policies on historical patterns. Lloyds of London has suggested that the scientific evidence used must reflect risk generally not just ‘in extremis’ which was the case with Hurricane Katrina.

Underwriting will be most directly affected by climate change. This is because underwriting is based on historical factors whilst climate change is underlined by the tension of being future focused whilst inherently unpredictable. The basis of underwriting is to try and anticipate loss and this is often shaped by the frequency and magnitude of previous losses. In order to keep insurance viable in the context of climate change, risks must be kept to a manageable level. Understandably the insurance industry plays a significant role in providing society with knowledge of emerging risks. Inaction by the government or communities will have a negative effect upon the availability and affordability of insurance. A helpful example to introduce this interplay rests with the British insurance industry and the risk of flooding through the United Kingdom. In 2000, the UK experienced massive flooding. In the years prior to this event and despite the protests of the insurance industry, the government did not appear interested in upgrading the preventative measures. Following the floods, public concern grew that insurers would withdraw cover. The aftermath of that incident witnessed the development of the current private/public partnership on flood damage offering a model for future partnerships dealing with climate change.

82 Lloyd’s, above n 79, 4.
The responsiveness of the insurance industry will be tested in two key areas – protections provided to policy holders and indemnifying clients who face litigation in connection with GHG policies. In relation to indemnifying liability of GHG producing companies, the main source of litigation will be negligence. Litigation can also be utilised by policy holders where there is a lack of loss prevention efforts. Litigation could expose holes in policies and underline the crucial connection between insurance liability and adaptation measures.83

Insurance companies need regulations which force companies to internalise the costs of carbon. It will, in theory, act as a financial incentive to companies to reduce pollution and therefore reduce the exposure of insurance companies to liability. However, there remains the problem of causation and attribution of fault and responsibility. Put simply, it is not altogether clear who is responsible for greenhouse gas emissions (GHG) in terms of time, place and composition of gases.

The idea of private public partnership is compelling for a number of reasons. Salmon and Weston identify the problem of inefficient, and indeed insufficient, risk transference that has plagued the private insurance industry.84 They believe that some risks must be scattered among other markets and not restricted to the insurance industry. Their focus is upon moving risk to capital markets. The groundwork required in order for inter-industry cooperation to flourish parallels the pre-requisites for adaptation. They identify three phases:

1. Clear, consistent identification and quantification of the future hazards and risks;
2. Reduction of those risks that can be reduced;
3. Transfer of those risks that cannot be reduced.85

F New Tools for Spreading Risk

As part of a study undertaken by the United States Government Accountability Office (USGAO) a number of insurance rating agencies were approached.86 The issue was what criteria are relevant when determining the rating given to insurance companies in the context of natural disasters and by implication climate change. It

---

85 Ibid 3-4.
was concluded that to maintain a secure rating insurance companies must display the ability to absorb losses from a hurricane with a 1% chance of occurring.\textsuperscript{87}

A number of ‘new’ financial tools or instruments have been introduced in the hope of spreading risk and increasing risk capacity. The most cited examples are weather derivatives and catastrophe bonds. Initially these instruments were utilised by governments such as Taiwan and Mexico to insulate public finances in the case of earthquake loss.\textsuperscript{88} Cat bonds have become popular with re-insurers and received a major boost in the aftermath of Hurricane Katrina as premium rates increased.\textsuperscript{89} Despite media attention the scope of cat bonds remains restricted. Figures demonstrate that in recent years leading up to Hurricane Katrina the use of cat bonds was actually on the decline.\textsuperscript{90} However since the cataclysm of Katrina, it appears that cat bonds have enjoyed a resurgence, quite possibly because the magnitude of Katrina threatened to send re-insurers into a tail spin.

According to a report authored by Guy Carpenter 2006 featuring the most cat bond activity,\textsuperscript{91} annual issuance in the cat bond market totalled USD 4.69 billion in new transactions, more than doubling the 2005 record of USD1.99 billion.\textsuperscript{92} Total risk capital outstanding increased to USD8.48 billion, compared to USD4.90 billion in 2005. A record number of 10 transactions set in 2005 doubled to 20 in 2006.\textsuperscript{93} 2006 was the most active year in the history of the catastrophe bond market, with $4.69 billion of issuance. This record volume represents a 136 percent increase over 2005’s previous record performance of $1.99 billion, and a 311 percent increase over the $1.14 billion placed during 2004. In two years, total annual catastrophe bond issuance has more than tripled.\textsuperscript{94} Guy Carpenter notes that, ‘During the year, a total of 20 transactions were completed by 15 sponsors, with Swiss Re and The Hartford accounting for four and two transactions, respectively’.\textsuperscript{95}

The expansion of the type of risk covered is shown through the Australian example: transaction activity for 2007 began in late January with Swiss Re endorsing

\begin{itemize}
\item \textsuperscript{87} Ibid 13.
\item \textsuperscript{88} Salmon and Weston, above n 84, 4.
\item \textsuperscript{89} Salmon and Weston, above n 84, 4.
\item \textsuperscript{90} Salmon and Weston, above n 84, 4 – ‘According to a Marsh McLennan Corporation (MMC) Securities Corp. 2005 report, total cat bond issuance in 2004 was only $1.14 billion, a decline from 2003’.
\item \textsuperscript{92} Ibid 1.
\item \textsuperscript{93} Ibid 1.
\item \textsuperscript{94} Ibid 1.
\end{itemize}
Australia Ltd., with a AUD100 million issue, which provides protection against Australian earthquakes and cyclones.96

Insurance exists as part of a public private partnership or synergy. The battle against climate change illuminates the co-dependency inherent in this relationship – Andrew Dluogecki describes it as an ‘intimate understanding’ of the risks that bind each set of stakeholders.97 The major issue we are presently concerned is the role of insurance in the context of adaptation and mitigation. As commercial insurability declines, there is a growing pressure brought to bear upon government resources. The sums required for comprehensive adaptation are very large. The private sector can provide a portion if prevailing circumstances are conducive but more importantly it can provide the skills honed in the private sector to complement the financial muscle of the public sector.

F Role of Government

Mills identifies government’s key role in the insurance/climate change debate as: maintaining availability and affordability of insurance.98 Failure by governments to act in this area results a failure or refusal to offer adequate coverage.99 There are of course other aspects of government policy that will impact upon the debate. As we have demonstrated in this paper the financial consequences for the insurance industry could see more of the burden shifted onto government and citizens.100 The two most prominent examples of state mandated natural disaster insurance are the National Flood Insurance Program (NFIP) and the Federal Crop Insurance Corporation (FCIC). Both schemes are established under legislation and are designed to promote broad participation. The USGAO provides a summary of the techniques used to achieve this goal:

1 by offering discounted or subsidised premiums to encourage participation; and

2 by making additional funds available during high loss years.101 The goal is to generate sufficient revenue for typical loss years. In high loss years it has had to borrow funds from the Federal Treasury which are then repaid at higher interest levels.

---

96 Ibid 6.
97 ABI, above n 80.
98 Mills, above n 74, 10.
101 Ibid 34.
In the context of insurance the private industry and government are engaged in a power struggle. The nature of the struggle is a balance between the private industries drive for profit and the government’s duty to provide financial security for their populations. The question of affordability is a key area and different government policy has sought to either encourage or coerce private participation in this area. For example in the US, different states have initiated different policies aimed at securing affordable insurance. Following Hurricane Andrew in 1992, the Florida legislature in cooperation with the private industry and regulators, implemented a framework to insulate the industry from severe losses and prevent insurers from withdrawing from the market. This led to the establishment of the Florida Hurricane Catastrophe Fund which acts like a state based reinsurer that provides insurance in situations where no private company is willing to underwrite disaster risks. The Florida Hurricane Catastrophe Fund (FHCF) is largely credited with saving the insurance industry in Florida from financial disaster following the 2004 hurricane season. Despite this success none of the states eventually affected by Hurricane Katrina, Louisiana, Mississippi etc, had a comparable system in place in 2005 when Katrina hit. In the case of Louisiana, the state government still refuses to provide similar state based insurance. Property owners must participate in the federal NFIP and the state based Louisiana Citizens Property Insurance Corp but the coverage provided by these programs is limited and needs to be augmented by the participation of private companies. In an attempt to attract and retain private insurers to the Louisiana market, the state abolished the Louisiana Insurance Rating Commission with the intention of making it easier for insurers to increase rates. A further incentive clearly designed to placate the insurance industry, is the offer of $100 million in matching grants to companies that insure homes in riskier areas. Critics believe that the policy panders too much to the insurance industry and there is virtually no guarantee that increased competition will follow resulting in reduced premiums for consumers.

Catastrophic risk insurance is expensive and climate change will exacerbate this cost – potentially to uncontrollable levels. Government is the best equipped agent to cope with the expenses of catastrophes at lowest possible cost. The government can more effectively spread financial risk, compared to the private insurance industry, but once again the cost both financially and politically is high. As mentioned earlier, insurance companies have withdrawn protection from particular risk areas namely following catastrophes. The USGAO has observed that to the extent that insurers are unable or unwilling to insure against catastrophic events ‘a subsequent

King, above n 99, 6.

King, above n 99, 6.

King, above n 99, 6.


Ibid 1.

Ibid 1.

Ibid 1.
lack of affordable coverage in the market place could impede economic recovery and development’.

An OECD study into the role of government in regulating climate change responses, has characterised intervention as either being: indirect or direct intervention.\textsuperscript{109} Indirect measures include regulation, developing a legal framework and adaptation measures. Direct intervention is less sophisticated but more bold and includes the government being cast in the role of insurer of last resort. We argue that the indirect form of intervention is preferable as it gives an opportunity to utilise the benefits of the private insurance industry. Many governments prefer post event aid relief. Despite being post event and lacking the requirement of premises, this system shares the hallmarks of an insurance program. The OECD has observed, ‘The fact that the transfer occurs automatically … does not diminish its risk transfer attributes’.\textsuperscript{111} What post event relief lacks when compared to state based insurance schemes, in that the latter generally collects a contributory payment from the affected people other than taxes which permits their participation in the scheme. However the fact that payment is usually uniform is indicative of a larger problem, it fails to segregate risk and reduce moral hazard.

In situations where major events have left insurance companies either unable or unwilling to provide insurance, the responsibility falls to the government making it in effect the ‘insurer of last resort’. David Moss argues that when government becomes the ultimate risk manager it moves through 3 phases – the third phase concerns consumer, environmental and natural hazard risk.\textsuperscript{112} Within this role government has 2 main roles in risk management

1. relocate risk away from consumers;
2. reduce risk through subsidies or mitigation programs.\textsuperscript{113}

Federal and state based public insurers have seen their exposure to risk increase. Problems such as growing populations in hazardous areas has meant that NFIP’s exposure has quadrupled since 1980 approaching USD1 trillion.\textsuperscript{114} The existence of federally mandated insurance schemes does not necessarily ease the burden on the prospective policy holder either. Insurance companies have been known to transfer

\textsuperscript{110} OECD, above n 52, 200.
\textsuperscript{111} OECD, above n 52, 192.
\textsuperscript{112} D Moss, ‘Governments Tend to First Focus on Risks Associated with Business Development. In the second phase, governments focus on risks associated with the employment of labour in the economic development process. In the third phase, governments increasingly assume more risk of their citizens. In this third phase, governments assume greater responsibility for consumer, environmental and natural hazard risk’ quoted in Freeman et al, ‘Disaster Financing in OECD and Developing Countries’ slide 14 <http://www.oecd.org/dataoecd/5/12/31931972.pdf> 6 June 2007.
\textsuperscript{113} Ibid slide 14.
the risk associated with the mandatory schemes back onto the policyholder. Following the 2004 hurricane season in Florida, insurers levied a 7% surcharge on every policyholder in Florida to recoup the cost of the insurance companies’ participation in the FCIC.

To what extent government has the capacity to undertake this role is unclear. In the US for instance, the question of whether current relief aid programs are sustainable in the face of climate change has not been adequately addressed Whilst federal and state governments in the US assume a major share of responsibility in relation to weather events, the exposure to extreme weather events has never been assessed. Public insurance schemes are not designed to make a profit. Neither the NFIP nor the FCIC is required to limit risk in accordance with its financial ability to pay claims on an annual basis. The wisdom behind this decision will be tested though in an era of climate change where unpredictability will be a factor. – good figures for the National Flood Insurance Program and Federal Emergency Management Agency (FEMA). Officials from the NFIP and FCIC maintain that their policy is to provide insurance against current, not future, risks. This could potentially be challenging as the exposure and magnitude of climate change associated risks remain unclear. According to these officials, insufficient information exists with which accurate assessments can be made – this despite efforts in the private industry to properly understand risk. Compounding the problem, government led research rarely includes economic impact resulting in information in such a raw form unhelpful to the private sector. The public sector has shifted its focus to man made disasters such as terrorism with the result that there is less agency regulation of natural disaster issues. A related problem is poor distribution of funds between the federal and state governments. Under the Federal Emergency Management Agency program, recipients of aid must apply for relief grants through their respective State. That State government is then required to make a 10% deposit for the grant. Following the terrorist attacks in 2001 the president and Congress immediately waved the 10% requirement. However, in relation to the damage sustained by Katrina, Congress took nearly two years to wave the 10% deposit it demanded of Louisiana and release USD750 million in additional aid.

This trend has been echoed around the globe, and is at times perplexing given the financial impact of natural disasters described earlier in this paper. However, there is an element of the government’s response to financial relief and terrorism which does cast some light on the current debate of insurance in relation to climate change. The effect of 9/11 showed that the government cannot expect to commit to post event financial reconstruction without the assistance of the insurance industry.

116 USGAO, above n 114, 34.
118 Ibid.
The US government appears reluctant to cooperate in the same fashion regarding weather related losses.

Government and regulatory bodies need to ensure that the insurance industry can adequately fulfill its function without collapsing under the weight of demand. Mills and other observers outline three objectives for government and regulators to ensure that

1. rates are adequate;
2. companies remain solvent; and
3. state insurance pools have the capacity to pay loss in the event of either a commercial collapse or withdrawal of cover for a certain risk.\(^{119}\)

The failure by citizens to take up adaptation measures commensurate with reducing risk is a problem that governments have tried to solve by making insurance mandatory and an example is the Citizens Property Insurance Co in Florida where all insurance companies must pay a levy to the fund which is closely governed by state regulators.\(^{120}\)

Mills has drafted a number of guidelines which would assist both government and regulatory bodies to create the right conditions for insurance to operate and augment the benefits which private insurance cover offers.\(^{121}\) Regulators need to:

- review the standards of insurability to identify new challenges, domestically and abroad, incorporate climate risks in solvency and consumer impact statements,
- encourage insurers to collect and analyse more comprehensive data on weather related losses, elevate the practice of CAT modeling.\(^{122}\)

Governments need to:

- foster and participate in PPP for risk spreading, reduce disaster losses through spreading and planning, maintain insurability by improving resilience to disaster losses, assess the government’s overall financial exposure to changing patterns of weather disasters.\(^{123}\)

Regulatory issues include the regulation of GHG emissions and the insurance industry generally. Understandably disclosure is a major requirement of any regulatory activity. In the context of insurance and climate change disclosure could require information relating to a company’s climate risk or where discounted premiums are being offered, require evidence detailing an offsetting reduction in losses. Important initiatives that can be of assistance include the Carbon Disclosure Project,\(^{124}\) Global Framework for Climate Risk Disclosure.\(^{125}\) As the titles suggest these programs are designed to create awareness of a company’s carbon related

\(^{119}\) Mills et al., above n 74, 32.
\(^{120}\) Mills et al., above n 74, 14.
\(^{121}\) Mills et al., above n 74, 30.
\(^{122}\) Mills et al., above n 74, 35.
\(^{123}\) Mills et al., above n 74, 36.
\(^{124}\) <http://www.cdproject.net/> 1 September 2007.
liabilities. In the US reporting of climate change liabilities of companies has remained low.

The Australian and New Zealand Carbon Disclosure Project, survey states that regulatory issues are impacting strongly upon responses of companies.\(^{126}\) It argues that there are two clear consequences for the private insurance industry.

1. The failure by the Australian federal government to ratify the Kyoto Protocol has compounded problems associated with regulatory uncertainty.

2. Companies are unsure of climate related liabilities which in turn affects the ability to develop reliable forecasts.\(^{127}\)

A key benefit of regulation should be to force companies to internalise greenhouse gas emissions and related activities. The Carbon Disclosure Project revealed that, "only 9% of respondents provided full reporting disclosure of their emissions supported by third party verification".\(^{128}\) Furthermore, only 25% of respondents displayed a sophisticated understanding of climate change related risks relevant to their operations.\(^{129}\) This makes it difficult for the insurance industry to quantify the nature of commercial risks/opportunities.\(^{130}\)

Australia is a typical example of covering the cost of natural disasters through ‘funds’ created by the accumulation of taxes. Despite being characterised as ‘a means to reserve against future obligations of the government to pay for disaster losses’ the application of this process is post event.\(^{131}\) The permanent fund in Australia is the National Disaster Relief Arrangements (NDRA) and is designed to supplement the private insurance market.\(^{132}\) Under the NDRA the Australian federal government provides financial assistance to the states and territories with the intention of relieving the burden of disaster relief payments. The federal government will reimburse the states for between 50-75% of their respective disaster relief payments.\(^{133}\) However, trends in the US have prompted the question of whether government relief agencies such as FEMA and NFIP have sufficient financial reserves to cope with rising losses.\(^{134}\) The caps that are currently being placed on amounts of relief awarded to victims are already faced with the prospect of being outstripped by claims. In Australia, relief programs and agencies have attempted to develop a more proactive policy. A study entitled ‘Natural Disasters in


\(^{127}\) Ibid 9.

\(^{128}\) Ibid 9.

\(^{129}\) Ibid 9.

\(^{130}\) Ibid 32.

\(^{131}\) OECD, above n 52, 200.

\(^{132}\) Ibid 9.

\(^{133}\) Ibid 32.

\(^{134}\) There is a fear that the state based relief agencies could not deal with the financial impact of an incident similar to Hurricane Katrina.
Australia’ is interesting in the sense that it shares many hallmarks with insurance but remains a post disaster relief payment system. Sentiments such as, ‘systematic and widespread process of disaster risk assessment’ and ‘move toward anticipation and mitigation’ are included in the 12 Reform Commitments suggested by the study. The proactive approach is important because it attempts to alleviate ‘moral risk’.

Two aspects remain problematic. Firstly, the form of relief payment is still ‘post event’ which is unsustainable and secondly there is a lack of a national approach to the issue. The failure to adopt a national framework does not allow adequate scope to appreciate deficiencies and ways of improving the current system. Currently disaster relief arrangements are the responsibility of state governments. The federal government will allocate funds upon request by the respective state government. For example, the National Disaster Relief and Recovery Arrangements (NDRRA) funding provides assistance to states provided ‘expenditure exceeds a certain threshold’. NDRRA funding does not apply where victims have not looked to take adaptive or risk reduction methods or maladaptation has undermined effective planning. This consequence ignores the unpredictability and covariant nature of risk associated with climate change and presumes the type of risk is easily understood and also that the magnitude of risk is manageable.

The study also concludes that ‘Australia is currently under prepared’ and whilst it cites insurance related problems, it fails to make the connection to the proactive response it advocates. An OECD study into the public/state mandated insurance schemes for catastrophes notes that the private insurance succeeds because it can segregate risk where required. Generally under a government based insurance or relief program the government will treat all claimants the same. The Australian federal government has sought to avoid this through the screening process under the NDRRA mentioned above. In what represents a departure from most government approaches it tends to have a discriminatory effect. It is apparent that the government is hoping to achieve a combination of the strengths of the respective private and public schemes, that is, reducing moral hazard whilst providing the required financial capacity.

All catastrophe insurance programs share seek to improve the respective nation’s ability to finance catastrophe risk through insurance rather than direct spending for disaster assistance. A number of reasons are given justifying the use of federal insurance schemes including:

137 Ibid 5.
138 Natural Disasters in Australia, above n 135.
139 OECD, above n 52, 195.
• Enhancing the current catastrophe system;
• Make property insurance more available and affordable in high risk areas;
• Promote the funding to research studies;
• Expand knowledge and understanding to scientific and financial aspects of natural hazards.

The Australian federal government’s approach to natural disaster insurance remains unclear. The government appears to place more emphasis upon the responsibility of individual consumers and business in conjunction with the use of private insurance policies. The situation is confusing for a number of reasons:

• Firstly, despite advocating a policy which features classic hallmarks of an insurance strategy the government does not appear to have any plans to substitute current post-disaster relief programs with a national insurance backdrop.

• Secondly the policy does not appear to appreciate that private insurance policies will only be available if necessary adaptive/preventative measures are in place or implemented. This cost will more often than not fall to governments, presumably local or state governments, but if the costs spiral than the federal government will inevitably be impacted upon.

• Thirdly, the policy is clearly inadequate for the dual climate change problem of unpredictable and co-variant risk. This outcome will disappoint a government which wants to limit any involvement to indirect intervention.

What does the federal government’s approach to natural disaster relief say about its underlying policies in the subject of climate change? A possible pointer to state based insurance in relation to large scale risk is the Terrorism Insurance Act 2003 (Cth).\textsuperscript{140} It establishes a government reinsurance treasury pool where the federal government makes insurance available in the event that private insurance companies have not offered it. It acts as a reinsurance program and operates in conjunction with market dynamics. The government’s response to insurance legislation was motivated by the inability of the private market to provide adequate protection against terror risk

This trend is mirrored by other nation’s policies. In the US the Terrorism Risk Insurance Act 2002 (TRIA) was established to deal with the risk of terrorist attack following September 11. The Act mandates that private insurance companies offer protection against terrorism risks while the government acts as reinsurer.\textsuperscript{141} At the


end of 2005 the operation of the Act was extended for another two years. The system works in the same way as the Australian program – the terrorist risk is similarly dealt with in France, Spain Germany and the UK. The bottom line is that governments have taken steps to ensure that insurers can withstand the impact of a catastrophic event and still make affordable insurance available.

In the US, the Terrorism Risk Insurance Act 2002 has not been mirrored by insurance schemes covering natural catastrophes. The topic has been debated over the years by Congress and bills such as the HR 21 in the 106th Congress and HR 1552 must receive special mention. The purpose of both bills was to improve the availability of homeowners insurance though the strategies suggested in each bill were considerably different. HR 21 sought to establish a new disaster reinsurance fund of around USD25 billion whereas HR1552 was to authorise the reinsurance coverage through auctioning of contracts. The 108th Congress also considered a tax deferred treatment of the catastrophe reserves of private insurance companies. The Homeowners’ Insurance Availability Act of 2005 was introduced into the 109th Congress and is designed to establish catastrophic reinsurance to state based insurance programs and private insurance companies.

The aim is to enhance the capacity of insurance. It does this through a three pronged approach:

1. Offering reinsurance at lower rates than private companies for catastrophic risk;
2. Ensuring private companies will be compensated up to a specified level when a hurricane occurs;
3. Continuing to offer reinsurance at reasonable rates following the hurricane.

Participation in the FHCIF is mandated by state legislation. The program is funded through premiums, investment earnings and emergency assessments of Florida’s insurance companies when required. It is doubtful that the government will move into the area of providing insurance as the commitment to post disaster relief aid is unwavering. Post disaster relief aid should be discontinued if insurance systems are to function effectively.

Governments also need to implement adaptation measures. A good example of this practice is found in Florida. Following the hurricane season in 1994 some counties within the state revised the Florida Building Code in order to improve the resilience

---

142 A review in 2006 of the Terrorism Insurance Act 2003 (Cth) concluded that Australia should follow the lead of the US Congress and extend the operation of the Terrorism Insurance Act 2003 (Cth). The German government also extended its legislation the Extremus Versicherungs-AG – for a further two years until the end of 2007.

143 Congress Recess Service Dept, above n 9, 10-11.
144 Congress Recess Service Dept, above n 9, 11.
145 Congress Recess Service Dept, above n 9, 11.
146 USGAO, above n 86, 14.
147 USGAO, above n 86, 14.
of buildings to hurricane strength winds. In 2002 the Building Code was amended on a state wide basis. These types of initiatives are extremely attractive to insurance companies. The 2004 hurricane season tested the effectiveness of the measures adopted following Hurricane Andrew in 1992. The positive effect was that only 1 company failed in compared to the 11 that failed following Hurricane Andrew. 2004 was unusual though in that four hurricanes hit the area in relatively close succession. This impacted on the ability of FHCF to provide the payments. The FHCF was at the time triggered into operation when damages reach USD4.5 billion (based on assessments from Hurricane Andrew) but in the case of 2004 each of the respective hurricanes were considered mid strength. The underlying consequence is that the average damage estimate was around USD2 billion – those who did not receive payments did not suffer damage which reached retention levels. The threshold was to be reviewed and it underlines the difficulty of capping damages in the face of unpredictable weather patterns particularly when the effect of adaptation measures remains unclear. Payouts must be reviewed in alignment with assessments of whether adaptive measures can reduce the amount of damage.

II Conclusion: Initiatives for Adaptation

In 2007 the Australian Federal government virtually re-invented its climate change policy. Despite the government’s recalcitrance regarding international initiatives such as the Kyoto Protocol it appears that it has conceded that

(a) climate change is occurring; and  
(b) some negative impacts will be unavoidable

This new stance is based on the IPCC Fourth Assessment Report ‘Climate Change Impacts and Adaptation’ and has meant that adaptation is a major focus of government policy.

Funds in the 2007-08 Federal Budget have been directed toward adaptation programmes (Media Release). From a total amount of $170 million:

- $26 million is for an Australian Centre for Climate Change Adaptation;  
- $100 million in programme funding for the Centre;  
- $44 million for an Adaptation Flagship as part of the CSIRO.

---

148 USGAO, above n 86, 14.  
149 USGAO, above n 86, 15.  
150 USGAO, above n 86, 19.  
151 USGAO, above n 86, 20.  
152 USGAO, above n 86, 19.  
153 USGAO, above n 86, 19.  
155 Ibid.
The purpose of the Centre is to implement the strategies contained in the National Adaptation Framework drafted by the Council of Australian Governments. The Centre has a strong educational role. Part of its mandate is to help decision makers, businesses and communities develop risk management strategies in the context of climate change.

The new federal government strategy does include a role for insurance if only in an indirect sense. The IPCC Report, upon which much of the Australian adaptation policy is based, highlights a number of vulnerabilities affecting the country. The IPCC has included as part of this list extreme weather:

"Ongoing coastal development and population growths in areas such as Cairns and south east Queensland are projected to exacerbate risks from sea level rise and increases in the severity and frequency of storms and coastal flooding."

Assessment of this particular risk will hopefully acknowledge the importance of the input of the insurance industry in developing policies designed to minimise risk associated with coastal development. Such policies should be used in conjunction with scientific work undertaken by the Adaptation Flagship. The tasks performed by the Adaptation Flagship include:

Identification of how to protect coastal infrastructure from likely changes in storm surge using well designed sea walls and flood barriers

Measures such as these could be crucial pre-cursors to any insurance policies that companies might offer. Without these measures an area could simply be declared ‘uninsurable’ which would shift the burden for financial adaptation back onto the government.

The ‘Adaptation Framework’ outlines a number of initiatives to counter risks that affect coastlines but its inclusion of insurance is somewhat uneven. Under the heading of 2.7 Settlements, infrastructure and planning it is recommended that government works in partnership with the private insurance industry to identify adaptation actions, share information related to risks and importantly identify and fill gaps in the knowledge used to assess insurance risks. The Framework identifies coastal communities as being particularly vulnerable. As part of understanding climate change impacts on the coast, the Framework acknowledges that a national

\[\text{References:}\]

159 Ibid 1.
160 Ibid 2. 
digital elevation model (a digital map of ground surface and terrain) (DEM) and nationally consistent mapping in the coastal zone are required.\footnote{Ibid 12.} The use of this type of information is crucial for insurance companies. It is impossible to assess risk without having recourse to up to date information and this has meant that the vulnerability of Australia’s coastline from extreme weather has not been adequately assessed. Currently such an instrument does not exist and is an example of where the government must fulfil its role in the partnership more adequately. In a similar vein the Framework mandates the implementation of a national ‘OzCoasts Portal’.\footnote{Ibid 12.} This is a central repository of information relating to coastal risks and climate change. Despite this insurance is absent from any discussion about disaster relief. Initiatives such as the ‘Adaptation Framework’ are imperative if Australia is to handle the financial impact that climate change threatens to bring. As this paper has stressed adaptation measures are necessary in order to attract insurance companies to offer affordable policies.

The future does look positive as insurance companies in the US offer new policies that operate in the climate change context. CERES has reported that at least 190 new policies incorporating climate change risk could soon be introduced to the market.\footnote{P Weekes and J Hannaford, ‘Insurers Embrace the Winds of Change’, 12 August 2007, 1 <http://www.theage.com.au/news/business/insurers-embrace-the-winds-of-change/2007/08/11/1186530670431.html> 30 August 2007.} In Australia Companies such as Insurance Australia Group, RACV, Suncorp and GIO are also developing new policies.\footnote{Ibid 1.}