



## Review article

## Government-sponsored natural disaster insurance pools: A view from down-under



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## ABSTRACT

In the light of the rising cost of natural disasters we review the provision of catastrophe insurance by the public sector in the US, France, New Zealand, Spain, the United Kingdom, and its absence in the Netherlands, where flood risk is viewed as a national security concern. We do this in the context of the Australian home insurance market where insurers increasingly employ risk-reflective, multi-peril premiums as new technology allows them to better understand their exposure to risk. Motivations behind government pools vary by country, as do hazard profiles. In the US, for example, pools have usually arisen in the face of market failure of private sector insurance following a significant natural disaster; the initial concern has been the provision of affordable insurance rather than disaster risk reduction. Government pools have certain advantages over the private sector including their ability to raise funds post-event, but face financial unsustainability given political intervention to maintain affordability of cover in high-risk areas. In Australia, it is too early to judge whether risk-based premiums are leading to better land-use planning and increased mitigation spending, but in the case of northern Australia, a region that faces flooding and tropical cyclone risks, rising premiums are causing concern in Government. Nonetheless, the corollary seems self-evident, i.e. in the absence of transparency about the cost of risk, there is no incentive on the part of homeowners, local councils or land developers to improve the 'riskycape'; insurers are the only actors with immediate financial incentives to acknowledge these risks.

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## 1. Introduction

Dealing with the threat of natural perils in ways that increase the resilience of communities poses a difficult policy area for government. Australia, like other jurisdictions, is episodically impacted by natural disasters from a wide range of perils [15]; in fact six different peril categories are responsible for the top 10 normalised insurance losses (Table 1). Much of the damage in such events is self-inflicted in the sense that the outcomes are heavily modulated by where and how we choose to live. If we take the case of flood, for example, on Wednesday, 5 March 1819, in the fledgling years of the Australian colony, the then Governor of New South Wales, Lachlan Macquarie, felt moved to issue a Government and General Order to be read in every church and chapel in Australia for the three ensuing Sundays. This followed large floods in the Hawkesbury River catchment near Sydney, a river system that continues to pose a significant threat to much larger populations today. The Governor criticised new settlers [for if it had not been for their]:

*wilful and wayward Habit of placing their Residences and Stock-yards within the Reach of the Flood (as if putting at Defiance that impetuous element which it is not for Man to contend with), many of the deplorable losses which have been sustained within the last few years at least, might have been in great Measure averted [13].*

Essentially there are two primary ways of reducing the direct economic costs of catastrophic events: either by way of mitigation<sup>1</sup> measures, or by reducing the financial impact on those directly affected with the sharing of costs among a wider population through government and/or charitable aid, or insurance. Government aid comes often in the form of post-event appropriations that can create budgetary difficulties and disincentives for mitigation [8,34,60,59]. This being the case, most advanced economies rely on insurance to fund a significant portion of disaster recovery and to diversify this risk through international reinsurance markets. Reinsurance, the insurance of insurance companies, has the added benefit of providing financial resources external to the local economy; this has been an important factor in the reconstruction of Christchurch following the destruction due to the 2010–2011 earthquake sequence, an event to which we will return in our discussion of New Zealand's Earthquake Commission (EQC).

Our study was motivated by questions about the role of government in the provision of catastrophe insurance and the potential for the insurance sector to be a positive actor in reducing the economic costs of natural disasters [50]. Both questions had high currency in Australia after the 2011 Queensland and Victorian floods, events that led to widespread public and political criticism of many insurers for their then failure to cover riverine flood damage [70]. Australian insurers have since responded by broadening coverage, so that as of May 2015 over 90% of homeowner's policies cover this peril [59]. This change has been possible largely because of the increased disclosure of flood mapping commissioned by local councils and the processing of these data in ways to allow for better risk identification [47,33,59].

The Australian experience in respect of flood insurance is just one manifestation of how advances in the use of Geographic Information Systems, remote sensing and simulation modelling are changing insurers' ability to understand and price their exposure to risk [52,74,75,29,55]. As a result of improving intelligence, private sector insurers may choose to offer cover only at rates far in excess of what those consumers were paying in the past, or even to withdraw from areas deemed too high risk [7]. At the time of

<sup>1</sup> Here we refer to *mitigation* in its traditional sense of precautionary risk-reduction measures rather than reducing greenhouse gas emissions as in the parlance of climate change.

writing this is an issue in northern Australia, a region prone to tropical cyclones and episodic flooding, and where premiums have risen to better reflect these risks [5]; the government has responded to public concern by convening a taskforce (The Northern Australia Insurance Premiums Taskforce: <http://jaf.ministers.treasury.gov.au/media-release/024-2015/>) to explore how premiums can be reduced; one of the mechanisms under consideration is a government-sponsored tropical cyclone reinsurance pool, like those evaluated in this study.

With this in mind we scrutinise various government-sponsored natural disaster insurance pools (sometimes called *residual market mechanisms* and hereafter *Government pools* or *pools*) in the US, New Zealand, Spain and France, as well as arrangements under consideration in the UK and their absence in The Netherlands. In ignoring pools in Japan, Scandinavia, Switzerland, Taiwan and Turkey, amongst others (see [46]), our survey makes no claim to be exhaustive. However it samples from the spectrum of possible arrangements and highlights certain challenges that beset all of them in dealing with the rising cost of natural disasters [63]. Following a brief overview of the various pools examined, subsequent discussion centres upon three questions: How do the pools price risk? How are deficits funded? Do the pools encourage disaster risk reduction? We then draw upon some illustrative examples from recent Australian experience of the role played by poor land-use planning in amplifying the cost of natural disasters and conclude with some discussion on the capacity of the insurance industry to help overcome this problem.

Lastly by way of introduction, *risk* in this paper refers to the financial risk defined as a multivariate function of: *hazard attributes* – for example, the frequency of landfalling tropical cyclones with peak gust speeds in excess of thresholds likely to cause property damage; *exposure* – the spatial distribution of insured assets and their values; and *vulnerability* – the cost of damage as a fraction of the insured or replacement value for a given hazard intensity. This conceptual framework underpins all catastrophe loss modelling that is now standard practice in the insurance industry to help inform its purchase of reinsurance, capital needs and increasingly, premium pricing [72]. In other contexts, risk has behavioural dimensions [62] but these are not considered here.

## 2. Brief overview of selected Government-sponsored disaster insurance pools

### 2.1. US pools

Since US pools have attracted significant scholarship (e.g.

**Table 1**

Top 10 Australian normalised (2014–2015) insurance sector natural disaster loss events. Normalised losses refer to the estimated insurance cost of historical hazard events if they were inflicted upon current society. The normalisation adjusts original losses for changes in building numbers; the average nominal value of new buildings since the time of the original event; and for the increased resilience of newer buildings in tropical cyclone-prone parts of the country (updated from [15]).

Rank	Year	Event	Cost (Millions AUD)
1	1999	Sydney Hailstorm	4475
2	1974	Tropical Cyclone Tracy	4178
3	1989	Newcastle Earthquake	3834
4	1974	Brisbane Floods	2701
5	2011	Queensland and Victorian Floods	2506
6	1983	Ash Wednesday Bushfires (Wildfires)	2371
7	1985	Brisbane Hailstorm	2046
8	2007	Pasha Bulker East Coast Low Storm	1966
9	1973	Tropical Cyclone Madge	1520
10	1990	Sydney Hailstorm	1433

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