National Insurance Project – Final Report

For the Mitigation and Risk Sub-Committee of Australia-New Zealand Emergency Management Committee

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Glossary

Abbreviation	Stands for
the Act	*Insurance Contracts Act 1984*
ABS	Australian Bureau of Statistics
AFCA	Australian Financial Complaints Authority
ACCC	Australian Competition and Consumer Commission
ANZEMC	Australian New Zealand Emergency Management Committee
APRA	Australian Prudential Regulatory Authority
ASIC	Australian Securities and Investments Commission
AWHDI	Average Weekly Household Disposable Income
BAL	Bushfire Attack Level (www.bushfireprone.com.au/what-is-a-bal/)
BoM	Bureau of Meteorology
CMIP5	Coupled Model Intercomparison Project
CPM	Convection permitting model
DRFA	Disaster Recovery Funding Arrangements 2018 (Department of Home Affairs, 2018)
DRFAWA	Disaster Recovery Funding Arrangements—Western Australia https://www.dfes.wa.gov.au/recovery/Pages/DRFA-WA.aspx
Elasticity	A measure of the percentage change in one variable in response to a percentage change in another.
FFDI	Forest Fire Danger Index
FEMA	Federal Emergency Management Agency
GA	Geoscience Australia
GeoScape	https://geoscape.com.au/about/
General insurance	Insurance other than life-insurance
GI Reform Act	General Insurance Reform Act 2001
GCM	Global climate model
GST	Good and services tax
GWP	Gross written premium
IBANZ	Insurance Brokers Association of New Zealand
ICA	Insurance Council of Australia
ICNZ	Insurance Council of New Zealand
Insurance Act	Insurance Act 1973

Insurance Regulations	Insurance Regulations 2002
IPCC	Inter-governmental Panel on Climate Change
LAPP	Local Authority Protection Programme Disaster Fund
MaRS	Mitigation and Risk Subcommittee (a subcommittee of ANZEMC)
NAIPT	Northern Australia Insurance Premiums Taskforce
Natural disaster	A serious disruption to a community or region caused by the impact of a naturally occurring rapid onset event that threatens or causes death, injury or damage to property or the environment and which requires significant and coordinated multi-agency and community response
NCCARF	National Climate Change Adaptation Research Facility
NDRRA	Natural Disaster Relief and Recovery Arrangements (superseded by the NDRRF from 1 November 2018)
NDRRF	National Disaster Risk Reduction Framework (Department of Home Affairs, 2018)
NIBA	National Insurance Brokers Association
NGO	Non-governmental organisation
PC	Productivity Commission (Australia)
PDS	Product disclosure statement
PMF	Probable maximum flood
PML	Probable maximum loss
QRA	Queensland Reconstruction Authority
RBNZ	Reserve Bank of New Zealand
RCM	Regional climate model
SEIFA	Socio-Economic Indexes for Areas— a product developed by the ABS that ranks areas in Australia according to relative socio-economic advantage and disadvantage.
State of the Climate Report	BoM/CSIRO (2018)
TPP	Third-party property — a type of motor vehicle insurance
TCFD	Taskforce on Climate-related Financial Disclosures
US	United States

Key points

Current state of cover

- Insurance benefits policyholders and the broader community in supporting disaster recovery. By pricing risk, insurance guides, and provides incentives for, risk mitigation.
- Insurance penetration in Australia and New Zealand is relatively high and there are no major gaps in the coverage that is available.
- Household insurance demand is largely driven by tenure. Most households
  - with the need for building cover, have building and contents cover
  - without a need for building cover don't have contents cover.
- Business needs vary greatly. Of those with need, most have property cover, but a significant portion may be without business interruption cover. Insufficient cover appears common due to an inadequate sum-insured, uninsured events (e.g. flood) and policy limitations (particularly regarding business interruption).

Issues and challenges

- Insurability depends on insurers having information on risks and being able to price by customer:
  - The insurability of flood events improved with access to flood information.
  - The release of further public information would have efficiency benefits.
- Climate change is expected to increase disaster risk, but the impact is highly uncertain.
- Improved climate change modelling will help insurance markets, but as insurance is sold yearly, the greatest benefit will be in improved decisions for investment in property and mitigation
- An issue for investors is that they cannot insure against higher risk/premiums in the future.
- The cost of cover is an important factor for both households and businesses.
- On a sum-insured basis, the average premiums have been reasonably stable. However, premiums for high-risk properties have increased and/or may further increase due to:
  - stringent building codes, which push up the rebuild cost particularly in high-risk locations
  - more granular (i.e. accurate) risk-based pricing, and
  - climate change, which is expected to increase losses
- In high-risks areas it may be preferable to not rebuild following a total loss. However; it can be difficult to obtain cover that encourages retreat rather than rebuild.
- What is affordable depends on circumstance:
  - Higher premiums generally reflect higher benefits to being insured and investors may trade-off higher risk/premiums for other benefits including property location and cost.
  - However, increasing premiums for high-risks may cause budget issues because they were unforeseen and lead to owners considering alternatives.
- Communication priorities to increase and sustain insurance levels/coverage include:
  - targeting owners in high-risk areas
  - encouraging small business owners to properly consider their risk
  - ensuring property investments are made with awareness of risk and insurance premiums.

Executive summary

Background

Australia and New Zealand are exposed to a range of natural disasters, including bushfire, earthquake, flood, storm, cyclone, storm surge, landslide, tsunami and volcano. The cost of these natural disasters has increased significantly, primarily because of increases in the value of the built environment and the costs of replacement.

Insurance plays an important role in managing the risk of natural disasters. In addition to the direct benefits to policyholders, insurance provides benefits to the broader community. When insured, households, businesses and other organisations put less demand on government assistance and recover more quickly following a disaster. Through pricing risks, insurers provide a price signal that can help improve decisions around investment and mitigation.

However, not all parties are fully insured. Furthermore, there are concerns that climate change will increase the costs of natural disasters and insurance.

The range of insurance products and levels of non-insurance/under-insurance

Households

Through home building, home contents and vehicle insurance, households can cover their assets from natural catastrophes. Estimates of the rate of non-insurance for Australia are presented in Table S1 below. The limited available information suggests non-insurance rates are similar (perhaps slightly higher) in New Zealand.

The take-up rate is strongly related to tenure. Lenders require mortgagees to have building insurance cover and strata buildings are required by law to be insured. Often contents insurance is purchased in combination with building insurance and consequently many households without need for building insurance do not purchase contents insurance cover.

There are many other influences on the take-up of insurance. Those without a mortgage or who have had a mortgage longer are more likely to opt out of building cover. The take-up of contents cover is also strongly correlated with the value of assets held, increases slightly with age and varies across different demographics. Controlling for other factors, income and wealth are not significant factors; however, there is evidence that those in financial hardship are less likely to purchase cover.

By default, insured households are covered for the key disaster risks. Flood cover (which can include storm-surge) is universally available but optional in Australia. In 2015, 93.7 per cent of household policies included flood cover. Most policies will also not cover land-slide and actions of the sea such as king-tides.

Underinsurance can be an issue, in large part because people underestimate their sum-insured. The increased use of cost-calculators has likely reduced the issue; however, there are no recent reliable

estimates of underinsurance that can confirm this. Of concern, many households do not use cost-calculators and/or reduce their sum-insured below the recommended amount.

Table S1: Estimates of rates of non-insurance for Australia

Coverage	Segment / risk	Per cent uninsured	Notes
Building	Owner occupied houses (excluding strata)	4%	Lenders require owners to hold insurance
	Strata buildings	0%	By legislation, strata buildings should be insured
	2nd homes, rental	~20%	Limited information available
Contents	Owner occupied houses (excluding strata)	10%	Typically bought with building cover
	Others (renters, strata owners…)	61%	Segment has no need to purchase building cover
	Average of all households	29%	
Vehicle	Fire cover	~20%	Vehicles are a key asset for low-income households
	Other disaster risk	~25%	

Source: See Table 7 on page 23. There is comparatively less information on non-insurance in New Zealand.

Businesses

The insurance needs of businesses vary greatly. There is limited information on the extent of coverage. The available evidence suggests that most businesses, who have a need, insure their property but that many businesses:

- do not have business interruption cover when it is appropriate (~15 per cent)
- have insufficient coverage due to:
  - gaps in events covered (e.g. with regards to flood)
  - are co-insured, as a result of the sum-insured being less than the asset value
  - have coverage limitations e.g. limits as to period of business interruption cover.

Anecdotally, it appears that the key contributing factors are cost and a lack of awareness and/or appreciation of the value of insurance. Coverage for assets should be available; however, in some situations it will be cost-prohibitive leading to businesses self-insuring.

Local and state governments

A condition of Commonwealth government assistance to state governments is that government assets are insured where it is cost-effective. Local and state governments are generally insured through mutual schemes that are reinsured on international markets. Most assets are insured with the key exception of roads. The Productivity Commission (2015, p. 24) recommended changes to address concerns that under the Commonwealth assistance 'essentially, state and local governments receive zero-cost natural disaster insurance'. The Commission's recommendations were not adopted.

Information issues

Insurability depends on insurers having adequate information to assess risk and being able to price individual risks. The information available for insurers has improved in the last decade and has led to an increased availability of flood cover and facilitated investments in mitigation (both private and public) to reduce claims cost and premiums.

The release of additional public information would improve the ability of insurers to assess and price risk. This could further encourage mitigation but could also lead to higher premiums for owners of the highest-risk properties.

As insurance is priced on an annual basis, the insurance industry should be able to adapt to changing climate risk through modifying premiums. In addition to increased risk, increased uncertainty may contribute to higher premiums as insurers seek greater levels of reinsurance and capital reserves. Improvements in climate modelling will help reduce uncertainty; however, the greatest benefit of improved climate modelling will likely be to planners, investors and lenders making property decisions.

Property prices tend to adjust to information about risk and the cost of insurance, but there are concerns and some evidence that many consumers do not understand the risk and cost of insurance premiums prior to committing to a property. These consumers may not understand the potential change in risk (and thus, their premiums) due to impacts from climate change. Of concern, the future impacts of climate change are highly uncertain and, currently, there are no financial products (insurance or other) that enable investors to manage this uncertainty.

Climate change and affordability

Insurance premiums are largely determined by the expected loss and cost of servicing claims. Average household premiums have been growing but this is primarily due to increases in the sum-insured. The premium rate per sum-insured has been reasonably stable.

Insurance affordability issues are expected to be concentrated in high risk areas. The premiums for high-risk properties have been growing at a much faster rate as a result of:

- building code changes, which have led to higher rebuilding costs, particularly in high-risk areas
- increased granularity of pricing that has led to higher premiums for high-risk households and lower-premiums for low-risk households.

Climate change is expected to heighten the disaster risks, particularly in high-risk locations. Alongside increasing granularity of pricing, this is likely to put increased pressure on the affordability of premiums for high-risk properties.

The issue of insurance affordability is nuanced. People may choose high-risk properties with higher premiums due to the appeal of other factors (such as lower property costs or lifestyle appeal). While higher risk drives higher premiums it also means higher benefits to being insured. While more granular pricing leads to higher premiums for some, it reduces the premiums for others and overall increases the extent to which premiums align with benefits.

Ideally a measure of affordability should reflect the ability to pay, the extent to which the premium reflects value and the extent to which premiums have changed unexpectedly. Nevertheless, for reasons of simplicity and data limitations, a practical measure of insurance affordability is the premium as a ratio of disposable income or other measure of financial resources. Another potentially useful and measurable indicator is the proportion of policyholders who opt-out of flood cover.

The most significant risks from climate change and increased pricing granularity appear to be:

- owners in high-risk areas who face budget constraints (due to change in income or unexpected premium increases) opt out of insurance
- adverse selection, whereby those facing high premiums (higher than their perceived risk) opt out
- affordability pressures lead to regulation that diminishes the effectiveness of insurance markets and creates risks to insurability.

Increased public and private mitigation can reduce the expected claims costs and thereby reduce premiums. A barrier to private mitigation is the difficulty in sharing information about the mitigation (to insurers) and the prospective premium discounts (to customers). Furthermore, there may be areas where mitigation is not cost effective and where retreat is preferable to rebuild.

Opportunities to encourage greater take-up

Insurance coverage in Australia and New Zealand is relatively strong compared to many international jurisdictions.

The report includes recommendations that aim to further strengthen the insurance market and address emerging issues. These are listed in Table S2 overleaf.

In addition, a set of potential communication strategies for encouraging greater take-up was identified. These are summarised in Table S3.

Table S2: Summary of recommendations

#	Recommendation	Page
Data and information—for insurers		
1	Governments should evaluate the benefits of releasing further information to analyse risks and do so where it is in the societal interest. The evaluation should include the efficiency benefits to insurance markets.	45
2	A business case for greater public investment in improved climate modelling should be developed, including consideration of the potential benefits to improved investment decisions as well as benefits to the insurance industry.	47
Data and information—for consumers and other stakeholders		
3	Governments should investigate the potential for the development of long-term financial products that can be used to price and hedge climate risk.	50
4	Governments should encourage consumers to investigate current and future hazard risk and insurance costs prior to property investments.	51
5	Governments should consider consolidating, releasing and promoting the use of public information on building standards.	52
6	Consideration should be given to the further use and promotion of insurance dispute-resolution information and, potentially, other measures of customer satisfaction to aid consumers in making insurance decisions.	53
Impact of climate change on premiums		
7	Companies releasing analysis on the impact of climate change should be encouraged to document assumptions and present sensitivity analysis.	60
8	Further investigation should be undertaken into insurance products that support retreat rather than rebuild in high-risk areas where retreat is desirable.	64
9	Further investigation should be undertaken into targeted assistance and encouragement for private mitigation to reduce expected losses and premiums.	66
Monitoring affordability		
10	The insurance industry should conduct further research into how demand responds to changing risk and premiums in high risk areas.	70
11	The insurance industry should monitor changes in the distribution of insurance premiums and insurance demand with a focus on high-risk areas.	75

Table S3: Potential communication strategy objectives

Objectives	Rationale / comment
1. Increase awareness of risks and cost of insurance, prior to investments in high risk areas	• To reduce the likelihood of premium shock and unaffordable premiums
2. Encourage greater uptake by households: • of flood cover in flood risk areas • of cover more generally in high risk areas	• Important group from perspective of disaster management • Relatively easy group to target
3. Increase awareness and trust in insurance among households and small businesses	• Trust in insurance is seen as barrier to insurance take-up. Trust typically higher among those who've made a claim
4. Increase trust in, and understanding and awareness of the value of, insurance among general population	• Broad communication has potential to influence large population • Lack of trust is a barrier to insurance take-up • People are influenced by decisions of others

1. Introduction and approach

The Mitigation and Risk Sub-Committee (MaRS) supports the Australia-New Zealand Emergency Management Committee (ANZEMC), which includes representatives from all levels of Australian governments and the New Zealand Government. ANZEMC aims to strengthen resilience to disasters by providing strategic leadership on emergency management policy and supporting capability and capacity development.

MaRs supports ANZEMC by informing national disaster risk reduction, risk management and risk measurement policies and capabilities by delivering outputs, that strengthen Australia's and New Zealand's preparedness for, and resilience to, natural and human caused events, in particular those with severe and catastrophic consequences. MaRS is committed to identifying existing, and new incentives and capabilities to enable a whole-of-sector, whole-of-society approach to disaster preparedness and resilience.

In 2019 the National Disaster Risk Reduction Framework (NDRRF) was released by the Australian Commonwealth Government. The vision for the NDRRF is:

> *In Australia, we are enabled and supported to actively reduce disaster risk and limit the impacts of disasters on communities and economies. All sectors of society understand and respond to social, environmental, technological and demographic changes which have the potential to prevent, create or exacerbate disaster risks.*
>
> *All sectors of society:*
> - *make disaster risk informed decisions,*
> - *are accountable for reducing risks within their control, and*
> - *invest in reducing disaster risk in order to limit the cost of disasters when they occur.*

The NDRRF outlines a coordinated approach to reducing disaster risk and includes a number of priorities. This project is focused on actioning one of the NDRRF priorities, 'Priority 3 - Strategy E: Improve the accessibility, variety and uptake of insurance'. It aims to provide a contemporary clear picture of disaster insurance across Australia and New Zealand to inform decision making, policy, processes and community engagement.

The project scope includes a thorough review of insurance across Australia and New Zealand to:

1. research levels of non-insurance, under-insurance, and the range of insurance products that currently exist
2. identify existing data/information that is available to stakeholders (e.g. governments, business, insurance industry and community)
3. identify reasons/barriers for non/under-insurance and potential impacts of a changing climate with more frequent extreme weather events. Consideration should also be given to insurance affordability (including a definition of insurance affordability with cost thresholds)
4. specifically identify any gaps in policies offered to small business and other organisations
5. make recommendations to address barriers and gaps
6. develop with insurers a joint government/industry communication strategy to increase and sustain insurance levels/coverage.

This review leveraged the information and analysis obtained from many related public inquiries and review (see Box 1 below).

The rest of this paper is organised as follows.

- Section 2 provides a background to the disasters, the insurance industry and disaster funding
- Section 3 examines the types and levels of cover for households, small businesses and other parties and considers any coverage gaps
- Section 4 discusses the information available to stakeholders
- Section 5 examines issues around the potential impacts of a changing climate and the affordability of insurance
- Section 6 considers a communication strategy and other recommendations.

Box 1: Reviews and inquiries relevant to this project

The financing of disaster recovery and the general insurance industry more generally have been subject to multiple inquiries and reviews, some of which are ongoing. The inquiries/reviews most relevant to this report include:[1]

- The Australian Competition & Consumer Commission (ACCC) is conducting a 'wide-ranging inquiry into the supply of residential building (home), contents and strata insurance in northern Australia.' The ACCC has released its first interim report (ACCC, 2018) in late 2018 and will release further reports in 2019 and 2020.
- The Productivity Commission (PC) conducted a review (PC, 2014) into *Natural Disaster Funding Arrangements*, which incorporated a review of 'Insurance markets', 'Insurance and Natural Disasters' (Vol. 2 Chapter 5) and lessons from other counties regarding 'Government backed-insurance arrangements' (Vol. 2 Chapter 8.3)
- The PC (PC, 2017) conducted a review into 'Data availability and Use', which included examining the benefits and costs of options for increasing availability of public sector data
- The PC conducted a review (PC, 2012) into Barriers to Effective Climate Change Adaptation, which included examining 'The role of insurance' (Chapter 16), 'Information provision' (Chapter 7) and 'Emergency management' (Chapter 13)
- The Financial Services Royal Commission (2018), which included consideration of Catastrophes and Natural Disasters Insurance
- 2015 Northern Australia Insurance Premiums Taskforce (NAIPT), which considered the feasibility of options to lower insurance premiums in areas subject to high cyclone risk.
- The Natural Disaster Insurance Review (2011), which investigated the issues associated with flood insurance in Australia following the 2010/11 Queensland floods.
- The Victorian Bushfires Royal Commission (2010), which made recommendations on preventing, preparing for, responding to and recovering from bushfires.

[1] Other recent relevant inquiries include: the 2014 Financial System Inquiry (http://fsi.gov.au/); the Queensland Floods Commission of Inquiry (2012); and the House of Representatives Standing Committee on Social Policy and Legal Affairs (2012) which investigated claims processing, dispute resolution and strata-title insurance.

2. Background

2.1 Natural disasters

2.1.1 An overview of natural disasters

Australia and New Zealand are exposed to a range of natural disasters including bushfire, flood, earthquake, storm, landslide, storm surge, tropical cyclone, tsunami and volcanic risk.[2] A brief description of the main types of natural disasters is provided in Table 2 overleaf.

The disaster risk and consequently the potential loss varies greatly by location, depending on climate, geology and/or topography. Many properties have limited or no exposure for some risks, while for other properties, the disaster risk is very significant and forms a significant contribution to the cost of insurance (see indicative estimates in Table 1 below). For example, in Australia over 80 per cent of properties have no known flood exposure and only around 5 per cent are exposed to flood at 1-in-100-year flood levels (also known as 1% probability flood events).[3] Similarly:

- cyclone risk is concentrated to areas of northern Australia
- storm-surge risk is concentrated to coastal properties
- bushfire risk is concentrated to properties adjoining bushland.

Table 1: Frequency (indicative) of disaster risk in Australian properties

Hazard	Percentage of dwellings affected by risk zone					Typical premium contribution (range low to very high risk)
	Nil	Low	Medium	High	Very high	
Flood	81%	7%	3.7%	0.6%	1.0%	<$100 to $3,000+
Cyclone	52%	43%	4%	3%	<1%	$10 to $1,750
Bushfire	75%	15%	7%	2%	1%	$100 to $700
Storm	n/a	41%	32%	26%	n/a	$25 to $170
Earthquake	n/a	26%	50%	~0%	n/a	$5 to $300

Source/notes: Data for hazards other than flood is drawn from tables 5.2 & 5.5 from ACCC (2018), which represent a sample of insurers' estimates. Flood risk is taken from https://www.icadataglobe.com/. For this table, the risk zone for flood is aligned to that of the other hazards. Flood percentages reflect known probability (they exclude the 7.4% of addresses that are flood exposed, but where the severity is unknown/unmapped). The premiums are taken from a mix of sources including ACCC (2018).

[2] In this study, a natural disaster is (consistent with NSW Disaster Assistance Guidelines) 'a serious disruption to a community or region caused by the impact of a naturally occurring rapid onset event'. Droughts, frosts, heatwaves and epidemics are not natural disasters.

[3] 80.46% of addresses that have no known flood exposure; 12.17% of addresses are exposed to known/ mapped flooding, comprising 0.95% First exposed to flooding at 5% probability; 0.6% at 2% probability, 3.7% at 1% probability, 6.9% at the probable maximum flood (PMF); and 7.4% flood exposed, but where the severity is unknown/unmapped. Source: The ICA (www.icadataglobe.com/).

Table 2: Types of natural disaster hazards

Hazard	Description
Bushfire	Extended periods of hot and dry weather, and easily combustible natural vegetation make parts of Australia highly vulnerable to bushfires. Western Australia and the southern Australian states are generally the most exposed regions
Flood	Australia and New Zealand experience floods ranging from flash flooding following storms to widespread flooding following heavy rains over river catchments
Earthquake	The main hazard component of earthquakes, which are more common New Zealand, is the resulting ground shaking that can damage or destroy infrastructure and threaten lives
Storm	Storms include strong wind, lightning strikes, inundation and hail. In Australia hailstorms represent the most frequent and highest cost natural disaster (on an annual aggregate basis)
Landslide	Landslides can occur without warning and are mostly caused by a rise in pore water pressure from intense short duration or prolonged rainfall, with about 50 per cent being influenced by human activity. According to the Australian Geomechanics Society, 'every local government area in Australia has landslide risks of some form'
Storm surge	A storm surge is a rise above the normal water level along a shore resulting from strong onshore winds and/or reduced atmospheric pressure. Storm surges accompany a tropical cyclone as it comes ashore. They may also be formed by intense low-pressure systems in non-tropical areas
Tropical cyclone	Tropical cyclones develop over the warm oceans to the north of Australia and can bring strong winds, heavy rain and coastal inundation to many regions on the western, northern and eastern coastlines
Tsunami	Waves caused by the sudden movement of the ocean surface due to earthquakes etc.
Others	Volcanic and hydrothermal activity.

Sources: Productivity Commission (2015, Vol. 2) and BoM (2019).

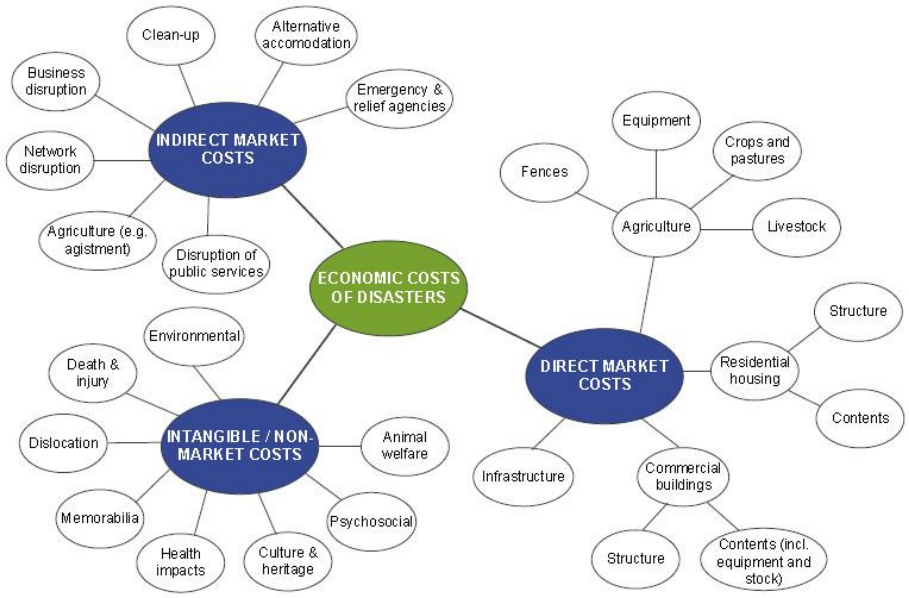
2.1.2 The impact of natural disasters

Natural disasters can impose significant economic, social, personal and environmental costs on governments, businesses, households and communities. One of the most common ways in which people think of natural disaster costs is in terms of fatalities and loss of property, although there are also significant economic costs, such as business disruption, health impacts and costs of clean-up and recovery. This is summarised in Figure 1 below.

The relative impact of natural disasters varies by type of disaster. For example, hail storms, which are a relatively frequent and costly natural disaster, tend to have a relatively small *fiscal cost* (i.e. cost to government budgets) because most of the damage is to insured private assets. In contrast, a flood has

a large fiscal impact because, in addition to private assets (a higher proportion of which are uninsured), it also damages public infrastructure such as roads, bridges and schools.

Figure 1: Economic costs associated with natural disasters



Source: Bureau of Transport Economics (2001) *Economic Costs of Natural Disasters in Australia*

2.1.2.1 Australia

The nominal costs associated with natural disasters in Australia has been increasing rapidly. A recent study[4] of natural disaster events between the period 1966 to 2017, shows recorded losses trending upward since 2000 (see Figure 2). In 2016, Australia recorded estimated natural disaster losses of $2.94 billion.

However, the losses illustrated in Figure 2 represent *nominal losses* and do not reflect the relative level of natural disaster risk. Nominal estimates of losses from natural disasters fail to account for changes over time such as increased population, wealth and dwelling density that increase the value at risk. To allow for an accurate assessment of risk across events, nominal losses are *normalised* to produce estimates of the costs of historical natural disaster events had they occurred under current societal and demographic conditions. These adjusted estimates—referred to as *normalised losses*—are illustrated in Figure 3.

Despite perceptions that natural disaster events have been becoming more frequent and/or severe, the study shows that from a normalised loss perspective, recent years in Australia have not been particularly anomalous. When considering aggregated losses by financial year, only four seasons since 2000 have ranked in the top 10 years by total loss (see Table 3 below). This does not necessarily mean that the frequency or severity of natural events has not increased over this period, but rather that the impact of these events from a loss perspective has not deviated significantly from historical trends.

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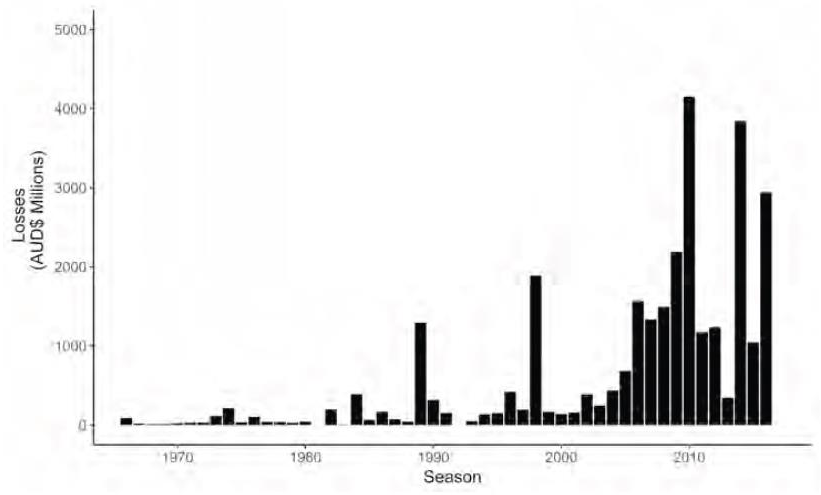
4 McAneney et al. (2019).

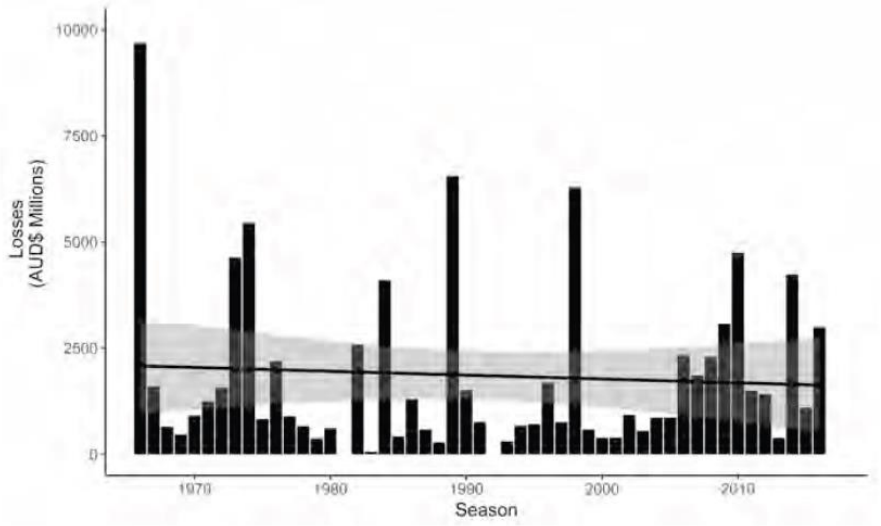
The study that calculated normalised losses found that 96 per cent of normalised losses arose from bushfire, tropical cyclones, floods and severe storms (including hailstorms). The 1999 Sydney hailstorm was the single most costly event, estimated at AUD $5.6 billion in 2017-18 dollars. Queensland and New South Wales were found to be the most 'disaster-prone' states together accounting for 70% of total national normalised losses since 1966. Tropical cyclone and hailstorm have been the costliest perils; the average annual loss due to these events was estimated at approximately AUD $2 billion per annum.

Figure 2: *Nominal* aggregate losses in Australia from natural disasters by financial year



Source: McAneney et al. (2019)

Figure 3: *Normalised* aggregate losses in Australia from natural disasters by financial year



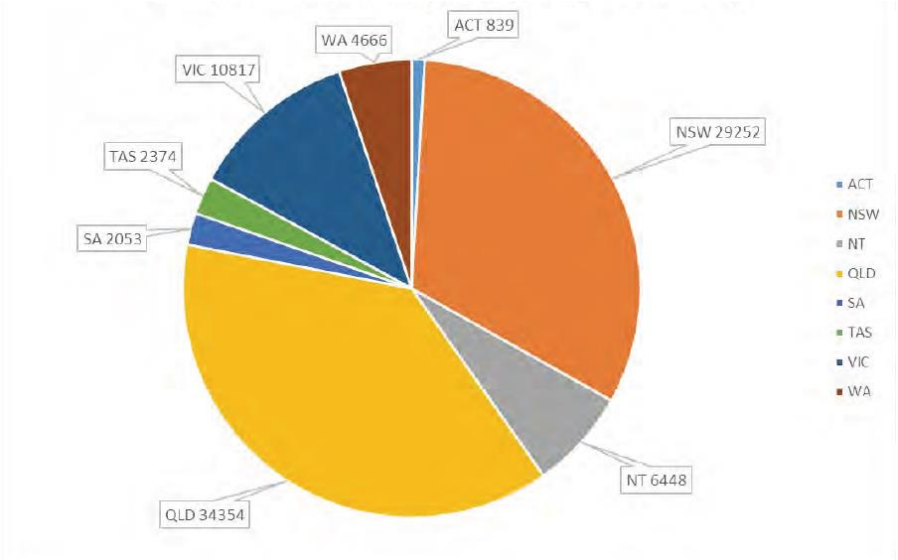
Source: McAneney et al. (2019). The methodology employed used changes in the number and nominal cost of new residential dwellings as key normalising factors. This allowed for all historical natural disaster losses to be normalised to season 2017, which is defined as the state of Australia in the 12-month period beginning 1 July 2017.

Table 3: Top 10 seasonal aggregate normalised losses by financial year

Rank	Season	Nominal loss ($M, AUD)	Normalised loss ($M, AUD)
1	1966	90	9,681
2	1989	1,293	6,552
3	1998	1,892	6,285
4	1974	215	5,449
5	2010	4,151	4,742
6	1973	114	4,630
7	2014	3,844	4,229
8	1984	390	4,097
9	2009	2,190	3,075
10	2016	2,942	2,993

Source: McAneney et al (2019)

Figure 4: Normalised insurance losses (2017) by State (AUD, $M)



Source: McAneney et al (2019)

2.1.2.2 New Zealand

New Zealand regularly experiences a range of natural disaster events, being located on the boundary of two tectonic plates. In a 2018 report, Lloyds of London ranked New Zealand as having the second highest annual expected loss from natural disasters, behind only Bangladesh.[5] The report estimated an

[5] Lloyds (2018).

expected annual loss of 0.66% of GDP for New Zealand based on its historic experience with natural disasters.

According to the Insurance Council of NZ (ICNZ), New Zealand has experienced more than 150 natural disasters since 1968.[6] While normalised estimates of these costs are not available, a review of inflation adjusted costs (based on CPI values from 30 June 2017) from natural disasters between the period 1968-2017 highlights the significant costs of these events.

Two major events drove the largest nominal and inflation-adjusted loss seasons, namely the 2010-2011 Canterbury earthquakes (the single most costly natural disaster event in New Zealand's history) and the 2016 Kaikōura earthquake. These two events were responsible for causing NZD $24.9 billion and $2.1 billion in inflation-adjusted losses respectively.

Table 4: Top 10 seasonal aggregate inflation adjusted losses by financial year

Rank	Season	Nominal loss ($M, NZD)	Inflation adjusted loss ($M, NZD)
1	2011	22,527	24,904
2	2016	2,174	2,198
3	1987	192	393
4	1968	21	301
5	2013	206	214
6	2004	145	192
7	1984	51	164
8	2014	153	157
9	2007	126	151
10	2015	116	119

Source: ICNZ (2019).

2.1.3 Disaster trends and the influence of climate change

There is some evidence of an increase in the frequency of natural disasters. Based on data collected from the ICA for the period 1970–2013, the Productivity Commission (PC) noted a significant increase in the number of natural disasters recorded over the period 1992–2013 compared to the number of events recorded for the period 1970–1991. The PC also noted that the average number of events recorded per annum had increased to six events per year since 2000, compared to an average of four events in the period 1970–1999.[7] However, this data should be interpreted with caution—historical

6 ICNZ (2019),

7 Productivity Commission (2015, Volume 2).

data can often be incomplete or defined differently to modern data and this can make direct comparisons difficult.[8]

Nonetheless, the most recent Bureau of Meteorology/CSIRO's 2018 State of the Climate report suggests that there has been an increased frequency and/or severity of some natural disasters as a result of continuing climactic changes.

- **Fire.** The report (p. 5) states there 'has been a long-term increase in extreme fire weather and in the length of the fire season across large parts of Australia since the 1950s.' Fire weather is largely monitored in Australia using the Forest Fire Danger Index (FFDI). This index estimates the fire danger on a given day based on observations of temperature, rainfall, humidity and wind speed. The annual 90th percentile of daily FFDI (i.e., the most extreme 10 per cent of fire weather days) has increased in recent decades across many regions of Australia, especially in southern and eastern Australia. There has also been an associated increase in the length of the fire weather season.
- **Flood.** The report (p. 8) states 'There is evidence that some rainfall extremes are becoming more intense'. As the climate warms, heavy rainfall is expected to become more intense, based on the physical relationship between temperature and the water-holding capacity of the atmosphere. The report also notes that 'as climate change continues, the combination of increases in heavy rainfall and rising sea levels means that coastal and estuarine environments may have an increase in flood risk from multiple causes'.
- **Cyclone.** The report (p. 9) states 'has been a decrease in the number of tropical cyclones observed in the Australian region since 1982'. However, the report notes 'cyclone intensity is harder to observe', and as such, it is harder to quantify any trends with a substantial degree of confidence. There is also evidence that tropical cyclones have been migrating poleward; that is, southwards in the Southern Hemisphere.[9]

The report also notes that while scientists often report on changes in individual climate variables, such as rainfall, historically significant weather and climate events are often the result of the combined influence of extremes in multiple variables occurring simultaneously. The frequency, magnitude and impact of these different variables can also be impacted by climate change.

The Australia Government's national climate projections[10] provide an indication of potential future changes in the climate that will have implications for future natural disaster risk. Some key findings from these projections include:

- Ongoing sea level rise, with the projected range of sea-level rise for the Southern Australian coastline to be between 0.07 to 0.19 meters above the 1986–2005 level in 2030
- More intense heavy rainfall across all parts of Australia, particularly for short-duration extreme rainfall events

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8 Bureau of Meteorology (2017).

9 Kossin et al. (2014) found evidence of a pronounced poleward migration of tropical cyclones, equivalent to 62 km per decade over the 31-year period 1982–2012.

10 Australian Government (2018) Climate Projections, retrieved from: https://www.climatechangeinaustralia.gov.au/en/climate-projections/

- An increase in the number of high fire weather danger days and a longer fire season for southern and eastern Australia
- Fewer tropical cyclones, but a greater proportion of high-intensity storms, with ongoing large variations from year-to-year.

A more recent joint report published by IAG and the US National Center for Atmospheric Research (Bruyère et al. 2019) provides a more in-depth analysis. Additional assessments from this work include that there will likely be: a shift southward in the areas at risk from large hail; more frequent flooding in urban areas and in small river catchments; increasing storm surge impacts associated with tropical cyclones and rising sea-levels; and a continued southward shift of the regions where tropical cyclones reach peak intensity.

There is great uncertainty over many projections, particularly with regards to tropical cyclones. Additional modelling capability (see section 4.1.2) will help reduce the uncertainty.

The effects of these on insurance premiums is discussed in section 5.2.2.

2.2 The insurance industry

2.2.1 Overview

Insurance is a means through which households, companies, governments and other parties protect themselves from financial loss. With regards to protection from natural disasters, the key types of insurance relate to protection of physical property (e.g. home and contents, buildings, vehicles, stock) and the protection of income (for businesses).

These types of insurance are provided in Australia and New Zealand by general insurance[11] companies and like organisations[12] that collect annual premiums from their policy-holders for the promise of financial assistance in the event of a claim. Insurance companies manage their risks through diversifying their exposure, holding financial capital in reserve and purchasing reinsurance (essentially insurance for insurers).

Across Australia and New Zealand, the general insurance industry generates annual gross written premium (GWP) AUD$55 billion a year.[13] There are multiple general insurance companies operating in Australia and New Zealand and the market is generally considered competitive.[14]

Insurers sell cover through a variety of channels and brands. Consumers may purchase cover directly from a provider (most common for household covers) or use an insurance broker (most common for

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[11] In Australia and New Zealand, the term 'general insurance' refers to insurance other than health and life insurance. It is referred to as 'property and casualty' insurance in the United States and non-life insurance in the UK.

[12] Mutual organisations and mutual arrangements may also provide insurance cover, particularly for local and state governments.

[13] Source: Australia: https://www.insurancecouncil.com.au/about-us, ICNZ (2018).

[14] Treasury (2014). A similar view was expressed by APRA (2017).

business covers). Many insurers sell via multiple brands directly[15] and may sell via intermediary brands (e.g. Coles insurance is underwritten by IAG).

2.2.1.1 Legislative / governance framework

The General Insurance industry regulation includes:

- prudential regulation, designed to ensure that insurers can afford to pay claims
- product regulation that governs the design of insurance contracts
- conduct regulation that governs the behaviour of insurance providers.

In Australia, the Australian Prudential Regulation Authority (APRA) licences general insurers and regulates prudential requirements. The industry is also regulated by Australian Securities & Investment Commission (ASIC) who's role includes monitoring and promoting market integrity and consumer protection and licensing. In New Zealand, the Reserve Bank of NZ (RBNZ) governs prudential regulation.

In Australia and New Zealand, the industry also self-regulates through the adoption of industry codes of conduct. In Australia, most general insurers are members of the Insurance Council of Australia (ICA)[16] and comply with an industry developed code of practice. In New Zealand, the peak body is the Insurance Council of New Zealand (ICNZ), which has developed the Fair Insurance Code. In both Australia and New Zealand, there are independent dispute resolution schemes that apply.[17]

There are some important differences in the structure and the governance of the industry between Australia and New Zealand.

In New Zealand, a Crown entity—the Earthquake Commission (EQC)[18]— provides natural disaster insurance for residential buildings and land called EQCover. EQCover provides cover up to NZD 150 000 plus GST against physical loss or damage from an earthquake, natural landslip, volcanic eruption, hydrothermal activity and tsunami. Homeowners automatically have EQCover with a valid private insurance policy for your residential building that includes fire insurance. The cover is funded from a compulsory levy added to all home insurance policies.

The ICNZ notes[19] that the RBNZ applies an 'extremely high catastrophe risk charge' to NZ licensed insurers, requiring insurers to hold sufficient capital reserves or reinsurance to cover their liabilities for a 1-in-1000-year catastrophe event rather than a 1-in-200 or 1-in-250-year event (which they state is more common globally)

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15 For example, Suncorp's brands in Australia include AAMI, Apia, Shannons, InsureMyRide, Vero, Terri Scheer, Bingle, CIL, Asteron and Tyndall, and in New Zealand include Vero, Asteron, Guardian Trust, Tyndall, AA Insurance, SIS, CMV/AXIOM and Autosure.

16 The ICA is the peak representative body for general insurers in the Australian market. It members include general insurers and re-insurers.

17 In NZ, a consumer with a complaint about a breach of the Code, can contact either Financial Services Complaints Limited or the Insurance and Financial Services Ombudsman.

18 The EQC is a Crown entity, established under the Earthquake Commission Act 1993. The EQC is a continuation of the Earthquake and War Damage Commission, which was established in 1945. https://www.eqc.govt.nz/

19 https://www.icnz.org.nz/understanding-insurance/industry-regulation/

2.2.2 The role of insurers

The primary role of insurance is to transfer risk from policyholders to insurers, thereby helping them recover from losses, such as those caused by natural disasters. Insurance provides policyholders with 'peace of mind' and can help the insured to secure finance for their home or other asset. For example, mortgage providers will typically require that the home is covered by insurance. Insurers also provide policyholders with ancillary services such as advice on risk mitigation, advanced warning and management of the rebuild/recovery process.[20]

It is in society's interest that people and organisations are insured. Insurers can reduce the burden on government in disaster management and, in particular, reduce the demands on societal support for financial assistance.[21] The negative financial shock of a disaster to individual households and organisations ripples through to the rest of the community. Insurance can help mitigate this impact and provide an economic stimulus following a disaster that speeds up the rate of recovery.[22]

Another broader benefit of the insurance industry is in analysing and pricing risk. Competitive pressure compels insurers to invest in information and capability to analyse and price risks. The price of insurance revealed in the market provides a signal to investors as to the risks associated with an asset that can be used to guide investment decisions (e.g. where and what to build) and actions to mitigate risk (including by governments and asset owners). Of note, as general insurance is written on an annual basis, this price signal is limited to present risk.

2.2.3 Generic issues in insurance markets

Given the benefits, if customers were to only pay a premium equivalent to their expected loss (known as the technical premium), we would predict the risk averse to fully insure against all risks. However, as discussed in this paper, insurance cover is not available for some risks and some property owners choose not to insure.

2.2.3.1 Insurability and affordability

Covers may not be available for some risks because they are not insurable. Risks that are insurable meet several criteria.

Criteria that are typically easily met by natural disasters include that losses:

- are accidental, infrequent and not foreseeable:

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[20] It is generally expected that people and organisations insure because they are risk-averse; that is, they prefer certain outcomes over uncertain outcomes of equal expected value. Expected value refers to the weighted (by probably occurrence) value of a set of outcomes. For example, the expected value of a $100 bet on a coin-toss with a payout of $210 for a correct call is $105 (50% x $0 + 50%x$210 - $100).

[21] Insurers can reduce the burden on government emergency management by providing advice and support to asset owners prior to and following a disaster.

[22] SGS economics and planning (2017) examines this economic stimulus effect. They use economic modelling to estimate the size of the economic impact of natural disasters and the economic benefit of insurance using three Australian case studies.

  - Non-accidental loss (deliberate damage) is a standard exclusion in insurance contracts
  - A high frequency and/or certainty necessitates a high premium, which may make insurance unaffordable and/or impractical relative to the option of self-insurance or risk mitigation.
- are definite, measurable, and significant:
  - definite in that the time, place and cause of the event is known and verifiable. For example, termite damage may not be insured because it is difficult to verify when the damage was caused
  - measurable in that an amount of loss can be calculated
  - significant, in that the loss should be sufficiently large to be worth insuring.
- involve a large group of similar items exposed to the same peril.[23]

However, there are also other criteria which may not be met for some natural disasters. Insurability also requires that there is limited risk of a catastrophically large loss that bankrupts the insurer. The risk of insurer bankruptcy may not be eliminated; however, it can be reduced to acceptable levels. Insurers mitigate the risk of bankruptcy using reinsurance through which they share the risk with organisations around the world. There is a residual risk, that a catastrophe's impact will be larger than the market can absorb but this is not a material risk for Australia and New Zealand where the probable maximum loss (PML) of a catastrophe is small, relative to the PML from catastrophes elsewhere (e.g. in North America). That is, the size of catastrophes in Australia and New Zealand should not be so great as to limit their insurability.

Of most relevance to this report, the insurability and affordability of natural disaster losses depends significantly on insurers having:[24]

- information to estimate the likelihood of the event occurring and the extent of losses to be incurred, and
- information and ability to set premiums for each potential customer or class of customer.

The former is required to determine the level of capital required to be held in reserve and to determine premiums. In the absence of information about the distribution of potential losses, an insurer will need to be extremely conservative in their pricing. The latter is required to overcome the issues of adverse selection and moral hazard discussed in section 2.2.3.2 below.

Affordability can also be an issue. This can occur because, in addition to the technical premium, insurers charge a premium loading (non-technical component of the premium) that covers the costs of providing the insurance service (i.e. for administration, claims and marketing etc.). A high premium loading can lead to reduced demand and in some cases a failure of the industry to supply cover because there is insufficient demand for insurers to recover the costs of providing the service. The issues associated with the premium loading are discussed in Section 2.2.3.3.

Finally, there can also be issues that are best characterised as problems with consumer demand. These are discussed in 2.2.3.4.

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[23] There are some exceptions to this criterion. Some insurers are known to insure unique assets such as a famous singer's voice.

[24] See Kunreuther & Michel-Kerjan (2007).

2.2.3.2 Information issues

Insurers need information to be able to underwrite and properly price risks. Issues with this information are a potentially significant source of insurance market failure.

Insufficient information can particularly be an issue where the insured is better informed about a risk than the insurer.[25] This can lead to a problem of adverse selection, whereby within a pool of property owners, the low-risk owners opt out of insurance because insurers do not identify and price them as being low-risk. For example, a homeowner whose house is located on a hill is less likely to purchase flood insurance if insurers do not offer the owner a discounted premium that reflects the lower risk. This leads to a vicious circle, whereby insurers increase prices to account for the likelihood that those that take out insurance are relatively high-risk, which in turn further discourages the relatively low-risk consumers from taking out cover.

The problem of adverse selection can be resolved with improved information. Using the example above, insurers with information that the house is located on the hill would assess the flood risk as low and offer discounted premiums to reflect this lower risk.[26] This insight helps to explain why flood insurance has been historically difficult to insure and why the release of flood-mapping information has resulted in flood insurance cover becoming more widely available.

Moral hazard is a related issue, whereby the insured takes less care as a result of being insured. For example, there is evidence that greater motor insurance cover can lead to poor driving behaviour. Similarly, a property-owner insured for flood may invest less in risk mitigation than one who is uninsured.

The issue of moral hazard is most commonly mitigated through deductibles (and co-insurance), which ensure the insured has a financial interest in minimising their risk. Insurers may also use information to address the risk of moral hazard. For example, some insurers are now using real-time information to reward better driving behaviour.[27] With regard to property, improved information may lead to insurers rewarding more disaster resilient building design and flood mitigation measures. The residual risk of moral hazard may be small. A recent study examining issue based on survey data from Germany and the United States found no evidence of moral hazard relating to flood and storm insurance; that is, no evidence that suggested the insureds took less care.[28] Nevertheless, the problem of moral hazard is a potential barrier to insurance cover being provided for some risks.

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25 This is commonly referred to as asymmetric information.

26 The issue of adverse selection can also be mitigated by insurers through bundling (offering insurance that covers multiple risks) and deductibles.

27 This is known as telematics-enabled usage-based insurance. It is common in the UK where the regulatory environment is favourable (see Tooth 2017).

28 The study (Hudson et al. 2017) examined how several 'risk reducing measures' and the extent of flood damage varied with insurance coverage. The 'risk reducing measures' included, for example, water-barriers and other flood-proofing, pre-event preparation and window protection (against hurricanes).

A lack of information may also be an issue even if insurers have more or similar information to the insured. To price risk, insurers need information on the distribution of risk, and a lack of information on the risk distribution can lead to insurers pricing conservatively high.[29]

Improved information on risks can help to address the issues described above and improve the operation of insurance markets. There are several potential benefits. Improved information on risk may lead to lower premiums as a result of:

- a greater take-up of cover, particularly by low-risk consumers who would otherwise opt out
- improved risk mitigation as a result of reduced moral hazard
- more efficient use of capital and lower pricing as a result of reduced ambiguity.

Some evidence and support for improved data leading to lower premiums is provided in submissions to the ACCC inquiry (ACCC 2018, p. 176).

2.2.3.3 Premium loading

Premium loading refers to the difference between the premium charged to consumers and the technical premium (i.e. the cost of the expected loss). The premium loading is required to cover the administration costs incurred by insurers in excess of the claims paid to policyholders. These include the costs of sales and marketing, underwriting, claims management, return on capital (i.e. profit) and taxes paid. They also include the expenditure by insurers for activities such as information gathering.

Higher administration costs lead to higher premium loadings and premiums, which may lead to consumers choosing not to insure or reduce their coverage. There is strong evidence that high administration costs reduce insurance demand both in terms of the take-up of cover and the extent of cover.[30]

In Australia and New Zealand insurance premiums are subject to taxes and levies. In addition to GST, these include:

- stamp duties, which are applied in each state and the Northern Territory (ranging from 9% to 11%)[31]
- levies in New Zealand, NSW and Tasmania to pay for fire and other emergency services. [32]

The taxes and levies have a significant impact on the premium loading as they are charged on the full pre-tax premium (which includes the technical premium and the pre-tax premium loading) rather than just the premium loading. Empirical evidence suggests that the taxes are a significant barrier to the demand for insurance and numerous inquiries have recommended that they be removed and replaced with less distortive means of raising the revenue.

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29 This is known in the insurance literature as the 'ambiguity premium', whereby a lack of knowledge of the risk distribution leads to insurers adopting a conservative approach to setting premiums.

30 See Tooth (2015). In New Zealand a Fire and Emergency New Zealand levy equivalent to 10.6c per $100 insured up to a maximum of $106 per household.

31 In NSW a stamp duty exemption is available for small businesses.

32 In NSW an emergency services levy (~14.5% in 2017-18) is applied. In Tasmania a 28% Insurance Fire Levy is charged on most commercial insurance premiums. The impact of taxes is discussed in Tooth (2015).

Administration costs may vary significantly by jurisdiction (e.g. due to different tax rates), by location (e.g. it can be more expensive to market to, and service, customers in more remote regions) and the type of risk being insured. The costs can also vary materially over time due to changes in the availability and cost of capital used by insurers and reinsurers to underwrite risk. For example, a series of large catastrophic international events occurring in a short time period can lead to a shortage of available global capital, which in turn would increase in reinsurance costs.[33] The availability of capital can also be positively affected by innovations, such as the growth in use of products such as insurance linked securities (ILS),[34] which can increase the available pool of capital available for reinsurance.

2.2.3.4 Issues with demand

Insurance coverage may also be low due to issues with demand. There are a range of factors that could contribute to consumers choosing less coverage than is optimal, including that consumers:

- lack awareness of the risks and the insurance covers available and a lack of appreciation of the value of insurance
- lack information on the tools and techniques to estimate their appropriate level of cover
- lack trust in the insurance industry[35]
- consider the costs of shopping for insurance are too high[36]
- believe they can self-insure (because they have enough savings) or rely on other sources of support.

Consumers may also not purchase insurance due to a range of behavioural biases, that may lead them to underappreciate risks and the value of insurance and underinvest in mitigation. A useful summary of the biases, their implications and possible remedies—developed by Meyers and Kunreuther (2018)—is provided in Table 5 below.

Table 5: Six decision making biases and remedies

Bias	Impact on beliefs	Manifestation	Remedy
***Myopia*: a tendency to plan over short future horizons**	Focus on short-term horizons in evaluating flood loss mitigation options	Failure to invest in cost-effective measures due to high upfront costs	Couple long-term loans with insurance premium reductions to spread the upfront cost over time.
***Amnesia*: a tendency to base decisions on recent experiences**	Fading memory of past floods and resulting damage	Failure to renew annual flood insurance policy	Automatically renew multiyear policies with constant annual premiums.

[33] Insurance-linked securities are financial instruments whose value is linked to insured loss events. They include catastrophe-bonds (Cat bonds), which are and other tradeable instruments.

[34] https://www.insurancejournal.com/news/international/2019/02/01/516526.htm

[35] See Tooth (2012).

[36] There is some evidence to support this as being a significant factor. Many households first purchase contents only once they purchase a property (and are required to have cover by their mortgage provider) (see Tooth, 2015). Having purchased insurance, retention rates are high.

***Optimism*: a tendency to underestimate the likelihood of personal harm**	Underestimation of the probability of a flood	Tendency to see flood insurance and mitigation as overly expensive relative to benefits	Stretch time horizon so individual perceives the probability of a disaster to be closer to the scientific estimate.
***Inertia*: a tendency to choose the status quo**	A preference for the status quo in protective investments; for floods, doing nothing	Reluctance to purchase insurance or invest in loss-reduction measures (e.g., storm shutters); procrastination in decision making	Make protection the default; make insurance a condition for obtaining a mortgage, or part of a bundled policy the resident can opt out of.
***Simplification:* a tendency to pay attention to only a few relevant factors**	Limited consideration of information available about flood risk	Ignorance of the flood risk of a location; lack of knowledge of possible remedies	Implement communication programs that make it easier for residents to understand their flood risk, providing examples of the consequences of a flood.
***Herding*: a tendency to make decisions by basing choices on the observed actions of others**	Tendency to base insurance decision on whether friends and neighbors have flood policies	Low rates of take-up at the community level	Implement communication programs that emphasize social norms of safety; offer seals of approval that enhance the social status of protective investments.

Source: The Ostrich Paradox: Why We Underprepare for Disasters (Meyers and Kunreuther, 2018).

2.3 Other forms of financing recovery from disasters

Individuals, organisations and communities may obtain post-disaster support from a variety of other (non-insurance) sources. These include Government assistance, donations (including support from family, friends and local community) and private savings. They are of interest to this project because:

- government assistance is often contingent on the recipient being uninsured and consequently the extent of insurance cover is a factor when considering reviews of government assistance
- the need for Government assistance is dependent on the insurance coverage
- government assistance arrangements, depending on how they are structured, may discourage (crowd-out) individuals from obtaining private insurance.

2.3.1 Government support

2.3.1.1 Australia

The Australian Commonwealth Government provides a key role in determining the extent of government assistance provided to individuals, organisations and local governments. The Commonwealth Government provides direct support to eligible individuals through two schemes:[37]

- Disaster Recovery Payment—This is a one-off, non-means tested payment of $1000 for eligible adults and $400 for eligible children affected by a major disaster either in Australia or overseas.
- Disaster Recovery Allowance—This is a short-term income support payment to help individuals who show that the disaster directly impacted their income.

The Commonwealth Government also provides financial assistance directly to the states to assist them with costs associated with certain disaster relief and recovery assistance measures. This includes recovery assistance for individuals and households, non-public sector organisations (small businesses, primary producers and not-for-profits organisations) and State and local governments. These arrangements are outlined in the Disaster Recovery Funding Arrangements 2018 (DRFA).

A summary of the types and rates of assistance is provided in Table 6 below. The assistance provided is based on thresholds[38] for *eligible disasters.*[39] The first threshold is 0.225 per cent of the state's total general government sector revenue and grants. This is sufficiently high such that it rarely surpassed.

A key principle embodied in DRFA is that it complements and does not replace insurance. 'States have a responsibility to put in place insurance arrangements which are cost effective for both the state and the Commonwealth'[40] and a condition on many DRFA assistance measures is that 'the applicant has utilised any available insurance arrangements prior to seeking assistance.'[41]

Each state has its own guidelines for disaster assistance that largely follow that of the DRFA. For example, the NSW Disaster Assistance Guidelines (NSW MPES 2015) provides for grants for households and individuals,[42] NFPs, primary producers and small businesses.

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37 https://www.homeaffairs.gov.au/about-us/our-portfolios/emergency-management/recovery-assistance

38 The DFRA (p. 12) states "The first threshold is 0.225 per cent of the state's total general government sector revenue and grants in the financial year two years prior to the relevant financial year; and the second threshold is 1.75 times the state's first threshold."

39 An eligible disaster is a natural disaster or terrorist act for which a coordinated multi-agency response was required, and state expenditure exceeds the small disaster criterion of $240,000.

40 DRFA (Clause 3.1.2 & 3.1.5) state 'the assistance is intended to complement other *state*-based strategies, such as insurance and natural disaster mitigation planning and implementation' and that '*States* have a responsibility to put in place insurance arrangements which are cost effective for both the state and the Commonwealth'.

41 See for example DRFA (Clauses 4.2.2 b, c, d).

42 Grants are for Essential Household Contents, Essential Structural Repairs, Essential Access Ways, Clean-up and Removal of Damaged Household Contents and Debris from Residential Property for the Elderly or Infirm, Clean-up and Removal of Asbestos Containing Material from Residential Property for Public Health and Safety.

The principle of not replacing insurance is reflected in each jurisdiction's guidelines, although how this principle is implemented varies by State. For example, the South Australian guidelines require evidence of an assessment of the cost-effectiveness of insuring the damaged asset,[43] whereas the guidelines in other jurisdictions state the expectation that councils take out (and claim upon) prudent insurance cover.[44]

The extent of assistance provided also varies by state. For example, with regards to repairs to homes:

- In NSW, there is no specified limit to the total assistance provided, although individual amounts are limited to the cost of a 3-bedroom 1-bathroom dwelling
- In Queensland the maximum amount is capped at $14,685 for families (less for single adults).

Table 6: Categories of DRFA assistance measures

Cat.	Category Eligible assistance measures	Reimbursement rate and triggers[45]
A	Assistance to alleviate personal hardship and distress arising as a direct result of a disaster	• Reimbursement rate is 50% to 2nd threshold plus 75% in excess of 2nd threshold.
B	Assistance to the state, and/or local governments for the restoration of essential public assets and certain counter-disaster operations.[46]	• Reimbursement rate is 50% between 1st and 2nd thresholds plus 75% in excess of 2nd threshold
C	Assistance for severely affected communities, regions or sectors and includes clean-up and recovery grants for small businesses and primary producers and/or the establishment of a Community Recovery Fund.	• Reimbursement rate is determined at the time of agreement of measures (generally 50% of the agreed measures) • Subject to approval by the Prime Minister.
D	Assistance to alleviate distress or damage in circumstances that are considered exceptional	• Reimbursement rate: is determined at the time of agreement of measures (generally 50% of the agreed measures) • Subject to approval by the Prime Minister.

Source: DFRA

43 The South Australian guidelines state 'where an uninsured essential public asset is damaged, the council will be required to demonstrate when submitting a preliminary assessment of damages or claim for government assistance that an assessment of the cost-effectiveness of insuring the damaged asset was undertaken within the past three financial years prior to the natural disaster event date.'

44 For example, NSW (NSW MPES 2015).

45 The DRFA makes provisions for state governments to activate relief and recovery assistance immediately following a disaster without seeking approval from the Australian Government.

46 This includes: restoration or replacement of essential public assets and concessional loans, subsidies or grants to small businesses, primary producers, voluntary non-profit bodies and needy individuals; and counter disaster operations for the protection of the general public.

2.3.1.2 New Zealand

In New Zealand, the restoration costs of local government infrastructure[47] are shared between the central and local governments. Under a Disaster Recovery Plan established in 1991, beyond a threshold, central government will only pay 60 per cent of restoration costs, with local government is responsible for the remaining 40 per cent. To be eligible for the central government support, the local government must demonstrate it can meet the remaining 40 per cent through proper maintenance, the provision of reserve funds, effective insurance, and/or participation in a mutual assistance scheme with other local authorities.

2.3.1.3 Impact of government support

A commonly raised concern (referred to as the '*charity hazard*') is that post-disaster assistance (Government and private) will discourage individuals from purchasing insurance. There is some analysis on this issue based on theory, surveys and cross-jurisdictional comparisons. The evidence is limited and mixed but, nevertheless, broadly consistent with expectations. For example, there is evidence, that charity hazard risk does occur but is less when there is uncertainty over the available assistance.[48]

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47 Local government owned infrastructure assets include water and sewerage assets, flood protection schemes, flood gates. Roads and bridges access subsidies from the NZ Transport Agency

48 Kousky et al. (2013) find evidence that federal disaster relief (which is dependent on the recipient purchasing insurance) in the US reduces the level of cover but not the take-up of cover. Brunette et al. (2013) found that the presence of governmental assistance through a fixed public support scheme decreases individuals' willingness to pay for insurance. Raschky et al. (2013) found evidence—through comparison of the institutional arrangements in Austria and Germany on the take-up of flood insurance—that 'charity hazard' was diminished where there is ad-hoc political decision making over the likelihood of assistance.

3. State of coverage

3.1 Households

3.1.1 Types of insurance

The main types of insurance used by consumers to protect their assets from natural disasters are home building, home contents and motor vehicle. In Australia, these classes of insurance are regulated under the *Insurance Contracts Act 1984 (Cth)* (IC Act) and the accompanying regulation *(*IC Regulations), which set out the standard cover terms and conditions (see Box 2 below). Under the IC Act, the insurer must cover the 'prescribed events' described in the regulations unless they have clearly informed the insured in writing (typically through the product disclosure statement, PDS).[49]

The typical home building and home contents policies will cover all major natural hazards, with some exceptions. The following events are also typically excluded:

- Actions of the sea—generally defined as including high tides or king tides, sea waves, normal movement or changes in ocean levels
- Erosion, subsidence or landslide, where it is not related to some other event (e.g. an earthquake)
- Soil-contraction—the settling, shrinkage or expansion in buildings, foundations, walls or pavements.

Storm surge[50] may or may not be covered. In some policies it is explicitly included (e.g. NRMA Insurance in NSW), in some explicitly excluded, and in some included if there is a related storm.

Flood cover was largely not available prior to 2007 due to a lack of flood-mapping data that insurers could use to underwrite and price flood risk. The increased release and development of flood-mapping information has led to flood cover being universally available across Australia and now flood-cover is included in most policies. Under some policies, flood cover is an optional extra or not offered at all.

Historically, the clarity of the definition of flood was an issue. Prior to the advent of flood-mapping, many insurers would cover flash-flooding but not rising flood. The distinction was a cause of confusion for customers and led to the development of a standard definition for flood. In policies where flood is excluded, disputes can still arise as to the source of water damage.[51]

The inclusion or exclusion of flood cover is the most significant difference, in terms of natural hazard cover, that can occur between different household policies. Policies may also differ with regards to

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49 IC Act (sect 35).

50 A storm surge generally refers to a rise above the normal water level along a shore resulting from strong onshore winds and/or reduced atmospheric pressure. There are some subtle differences in the definitions contained in the PDSs of different insurers.

51 To reduce risk of confusion, when NRMA Insurance excluded flood it also excluded storm surge and rainwater run-off.

whether they cover tsunami and storm-surge.[52] Of note, flood is the only natural hazard for which there is a standard definition.[53]

Contents insurance is typically bundled with home building and covers the same set of hazards as the building insurance policy.

All household insurance products are written on an annual basis. that is, there are no multi-year insurance covers (i.e. whereby the premium is determined for multiple years). Consequently, households cannot insure against the risk of premiums increasing significantly over time.

Box 2: Standard cover in the IC Act

The IC Regulations declare prescribed events in relation to a contract. For home building these include the following natural disasters:

- fire or explosion
- lightning or thunderbolt
- earthquake
- storm, tempest, flood (within the meaning given by section 34), the action of the sea, high water, tsunami, erosion or land slide or subsidence

Notable exclusions include:

- depreciation
- wear and tear, rust or corrosion
- the action of insects or vermin
- intentional damage by the insured or residing family member.

3.1.2 Cover for the primary place of residence

3.1.2.1 Levels of cover

The demand for home-building insurance is most significantly determined by building type and tenure. Strata insurance (which incorporates building cover) is mandatory and typically purchased by the body-corporate.[54] Mortgage lenders will typically require that a mortgage holder will take out home-building cover on the property; however, (we understand) this requirement is rarely reviewed once the loan has been established. While all households, regardless of building type and tenure, may

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[52] Other differences between home and contents insurance policies include whether there is cover for accidental damage, fusion (i.e. electric motor damage) and how the limits of cover are determined.

[53] 'flood' means the covering of normally dry land by water that has escaped or been released from the normal confirms of any of the following: (a) a lake (whether or not it has been altered or modified); (b) a river (whether or not it has been altered or modified); (c) a creek (whether or not it has been altered or modified); (d) another natural watercourse (whether or not it has been altered or modified); (e) a reservoir; (f) a canal; (g) a dam.

[54] http://understandinsurance.com.au/types-of-insurance/strata-insurance. In New Zealand, the Unit Titles Act requires buildings (apartments) to be fully insured.

purchase home-contents insurance—as noted below—it is often purchased in combination with home-building insurance.

There have been numerous studies on the household demand for buildings and contents insurance in Australia. These have included customised surveys and analysis of household survey data.[55] The most reliable source of data appears to be the Australian Bureau of Statistics (ABS) Household Expenditure Survey (HES).[56]

A summary based on the ABS HES is provided in the table below. As reflected in the table, the rates of non-insurance depend significantly on the segment being considered. Of those who may purchase building insurance (home-owners that are not in a body corporate), around 4 per cent are without building insurance cover and 10 per cent are without contents cover. Among other segments the percentage without contents cover is significantly higher. Over 60 per cent of households who are renters and/or are in a strata complex do not have contents insurance cover. Estimates derived from other surveys have shown broadly similar results, although there are a few variations.

There is relatively less information on non-insurance from New Zealand. Based on a number of sources, we believe the rate of uninsured buildings in New Zealand is similar to, but possibly slightly greater than the Australia rate.[57]

Table 7: Rates of non-insurance (implied from ABS HES 2009/10)

Coverage	Segment	Per cent uninsured	Source/comment
Building insurance	Owner occupied houses (excluding strata)	4%	Fairly stable results measured over time and through different surveys
	Owners in strata units	0%	Strata insurance is mandatory[58]
Contents insurance	Owner occupied houses (excluding strata)	10%	
	All households	29%	Results vary by survey
	Without need for BI (Renter or owner in strata)	61%	
	Households without BI	66%	
	Not-owners Renters/ other	68%	

Source/notes: The rates are from ABS HES 2009/10; however, they have proven to be reasonably stable over time.

55 Obtaining an accurate measure of the number of households uninsured is difficult.

56 The HES has been conducted every 5–6 years. It includes data on expenditure (including importantly on insurance premiums) and many other useful household, family and individual characteristics.

57 These sources include unverified estimates provided by the ICNZ, EQC and our own unpublished analysis.

58 Strata Communities Association (2019) notes that anecdotally, it is common in small strata title complexes where the body corporate is inactive that individual owners take care of their own insurance. As analysis of the ABS HES identifies strata-units based on payment of body-corporate fees, such cases would be incorporated in the 'Owner occupied houses (excluding strata)' group.

In 2015, 93.7 per cent of home building policies in Australia included coverage for flood; that is, 6.3 per cent opted out of flood cover. Unfortunately, it is not known the extent to which those who opt-out are in high-risk areas. However, we would expect that these policies are predominantly in areas where the inclusion of flood is expensive because there is some flood risk (As noted earlier, only around 20 per cent of policies have some flood risk). The ICA reports that only 1.6 per cent of Townsville flood policies have been denied because the policy did not cover flood. There is also anecdotal evidence of some strata complexes not being covered for flood.[59]

3.1.2.2 Underinsurance

Households may also be under-insured whereby their level of cover is insufficient to cover a total loss.

While underinsurance appears to be more common than non-insurance, the impact is less as it only comes into effect when the loss is in excess of sum-insured. In its recent review, the ACCC[60] found most home building claims are for a partial loss and that insurers often pay out claims "up to, and even a margin over, a consumer's sum insured". Similarly, in a 2015 review, the New Zealand Treasury (2015, pp. 4–5) concluded that 'although underinsurance could cause difficulties for some householders after a major event, this would not lead to major pressure for Government to intervene since … modelling shows that most losses would fall well below the sum insured limits.'

Policyholders may be underinsured due to the difficulty in estimating an adequate level of cover. Estimating the sum-insured for building cover can be challenging as the rebuild cost can be substantially different to the original build cost and property value.[61] The rebuild cost can be substantially higher than the original build cost due to changing regulations and codes. Furthermore, a disaster that affects multiple buildings can lead to a surge in demand and, consequently, prices to undertake repair.

To address the risk of underinsurance, policyholders may take out a 'total replacement' policy which covers the risk of being underinsured. However, such policies are expensive, and they make up a small proportion of all policies in Australia.[62] In New Zealand such policies were common prior to the Canterbury earthquakes in 2011 but are now rare.[63]

There is limited information on the extent of underinsurance. Following the 2003 Canberra bushfires, the Australian Securities & Investments Commission (ASIC) investigated building under-insurance (ASIC 2005) and found "between 27 per cent and 81 per cent of consumers were underinsured by 10 per cent or more against current rebuilding costs."

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59 Strata Communities Association (2019, p. 10) provides an example relating to the Townsville floods.

60 The ACCC (2018, p. 159) found this to be the case 'most claims for damage to buildings, including those arising from natural catastrophes in northern Australia'.

61 As noted by New Zealand Treasury (215, p. 4) 'Every house is different and there is no single right answer about how much it would cost to rebuild after a disaster.'

62 ACCC (2018, p. 158) reports that total replacement policies are only offered by three insurers and, in 2017–18, only made-up around six per cent of all home and contents insurance policies issued by these three insurers.

63 New Zealand Treasury (2015).

The current level of underinsurance for building cover is likely to have fallen since 2003 due to improvements in the availability and use of building-cost calculators that more accurately estimate the sum-insured and the increase in the support of insurers in determining an adequate level of coverage.[64] Nevertheless, we have received anecdotal information of cases where houses are underinsured as a result of rebuilding costs being underestimated. Furthermore, ACCC[65] noted there were cases of underinsurance 'whereby a claim pay out was only a fraction of the estimated value of the loss'.

The New Zealand Treasury (2015, pp. 7–8) on underinsurance concluded that 40–85 per cent of homes could be under insured by 10–50 per cent. However, they note that obtaining precise estimates are difficult and acknowledge that not every homeowner will want or need this level of cover.

The results of a 2012 household survey suggest that most households are confident they are adequately covered.[66] However, the same survey found that around 30 per cent of policyholders relied solely on their own estimate and did not use a calculator. Furthermore, there is some evidence that consumers may deliberately select a lower sum-insured to reduce their premium.[67]

Underinsurance appears to be more common with contents insurance. The 2012 survey found that, of those with contents insurance cover, around 10 per cent (representing about 0.7 million households) reported that they knew their cover was less than the costs of replacement of goods and a further 34 per cent (representing around 2.2 million households) were unsure.[68] Those who knew that their level of contents cover was insufficient were asked why. Around 40 per cent indicated that reducing the premium was a factor and 18 per cent indicated that they thought they would unlikely ever make a full claim.

3.1.3 Influences on demand

There are multiple influences on the demand for insurance. To disentangle the various influences, Tooth (2015) undertook a regression analysis[69] that controlled for a range of variables relating to the assets to be insured, building type and tenure, demographic characteristics and location.[70]

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64 See ACCC (2018, pp. 158–160)

65 The ACCC (2018, p. 159)

66 Tooth (2012, p. 21). Only 6 per cent of respondents disagreed with the statement that "I am confident that I am adequately covered by my existing building insurance policy".

67 Susan Bell Research (2014, p. 66) provides anecdotal research. Quantum (2014, pp. 17–18) survey data suggests that around 4% of homeowners with building insurance deliberately undervalued their sum-insured to reduce their premium. A potential factor is that, due to the high cost of rebuilding, the recommended sum-insured may be significantly higher than the property value.

68 Similar results were found by Quantum (2014, pp. 17–18).

69 Regression analysis is a statistical method that involves modelling and analysing the relationship between a dependent variable (e.g. the decision to insure, the amount spent on insurance) and one or more independent variables (e.g. housing tenure, age, value of assets).

70 The analysis was conducted on the household expenditure data contained in the ABS HES over four survey periods (1993/94, 1998/99, 2003/04 and 2009/10).

The key findings were that households were more likely to purchase insurance and spend more on insurance if:

- they have a need for building insurance (i.e. are an owner in a house) and had a mortgage,
- they have a greater value of assets to insure, and
- the premium loading is lower (as proxied by state premium-based taxes).

Of relevance to the discussions of affordability, income and wealth do not appear to be significant drivers in determining insurance purchases. Once other factors (notably the value of assets to insure) are controlled for, the influence of income and wealth is positive, but small.[71] A summary by factor is provided in the table below.

Table 8: Influences on the demand for home building and contents cover

Factor	Finding / comment
Asset characteristics	
Household tenure	• Mortgage providers typically require (but do not monitor) that the property is covered by building insurance. Consistent with this requirement (and the associated risk exposure) households with a mortgage are more likely to have home building insurance. Some households report not holding home building insurance despite holding a mortgage. The likelihood of being uninsured increases with the period since taking-out the mortgage and reduces with the outstanding debt.[72] • The take-up of contents cover is closely tied to the need for building insurance, which is determined by tenure; it is lower for owners in a body corporate and lower again for those who do not own their dwelling.
Value of assets	• The value of contents is a significant determinant of the likelihood of purchasing contents insurance and the expenditure on contents insurance. • A weak relationship has been found between the value of the dwelling and the decision to purchase building insurance.[73]
Financial	
Premiums (i.e. price)	• The influence of premiums is complicated as higher premiums may reflect higher expected claims, which are a consumer benefit (see discussion in Section 5.2.2). • There is strong evidence that higher premiums that relate to the premium loading (e.g. taxes) have a material negative impact on the take-up and expenditure on insurance.
Income	• Income is correlated with insurance demand in several ways. Those with higher incomes tend to have more assets to insure, greater wealth which may be used in an emergency and greater disposable income with which to purchase insurance.

[71] Tooth (2015, p. 23) results suggest that, having controlled for the value of the dwelling and contents, a 10 per cent increase in income is associated with a less than 1 per cent increase in the expenditure on house and contents insurance.

[72] Tooth and Barker (2007, pp. 14-15).

[73] Tooth and Barker (2007, p. 15).

Factor	Finding / comment
	• There is evidence that households with greater income are more likely to hold insurance, but after controlling for other characteristics (value of assets etc), the influence is small.[74]
Wealth	• There is some evidence that households with greater wealth are slightly less likely to insure, which may reflect wealthier households choosing to self-insure.
Financial exclusion/ hardship	• The likelihood of a household being uninsured for contents is correlated (after controlling for income, tenure etc) with several measures of financial exclusion. Those who indicated they were not able to raise $2000 in an emergency were less likely to be insured. Perhaps not surprisingly, those unemployed and those who had money shortages were more likely to be non-insured.
Other factors	
Search costs	• There is strong evidence that decisions to purchase contents insurance is closely related to that of purchasing building insurance. This is consistent with there being significant search costs associated with purchasing insurance.
Other demographic factors	• After controlling for other factors (income, value of assets etc), evidence was found that the insurance demand for contents insurance is slightly related to age (less for age<25 and more for age>55). • Country of birth is a significant factor with those born in non-Western countries significantly (15 percentage points) less likely to purchase contents insurance. • Those whose main language at home is not English are twice as likely to be not-insured, however once other factors (e.g. income, house tenure) are controlled for, the correlation between language and the take-up of insurance is weak.[75]
Influences of family and friends	• There is some evidence that parental attitudes to insurance are influential on the household's insurance decision.[76] • People are less likely to be insured if other people they know are not insured.

Sources: See analysis and references in Tooth (2015), Tooth (2012) and Tooth and Barker (2007).

3.2 Other household covers

3.2.1 Properties other than the primary residence

There is limited information on the extent of insurance for properties other than the primary residence (e.g. holiday homes and rental properties). In a customised survey of Australian households, Tooth (2012) found that—consistent with other anecdotal evidence—around 22 per cent of holiday or second homes were without (buildings and/or contents) cover and 19 per cent of rental properties

[74] The elasticity of expenditure on house and contents insurance was less than 0.1 implying that a 10 per cent higher income would result in a less-than 1 per cent increase in insurance expenditure (controlling for housing tenure, value of assets and other demographic variables). See Tooth (2015, sect 5.4.1).

[75] Tooth (2012).

[76] Tooth (2012, p. 31-32).

were without building cover.[77] The rates of non-insurance are significantly higher than that for the main property, but this is expected because the value of assets is generally less in second homes and because multiple property owners are better able to self-insure.

3.2.2 Vehicle insurance

The disaster risk to vehicles differs to that of buildings. Storm damage (in particular, hail) can be significant; however, with advanced notice, people can move vehicles away from flooded areas and from fire hazards.

Nevertheless, insurance cover for motor vehicles can be important. Generally motor vehicles are not included as part of state assistance. Low-income households are more likely to live in rented accommodation and be more reliant on their car for work due to a lack of public transport where they live.[78] Consequently for many low-income households the car will be the most valuable and important asset they own.

Insurance cover that covers damage to the vehicle is optional in all jurisdictions.[79] In a recent review of optional motor insurance in Australia, Robinson (2017) estimates:

- 1.3 per cent (~0.25 million) of vehicles are not registered (and therefore likely to be uninsured)
- 11.9 per cent (~2.28 million) of registered vehicles have no vehicle insurance
- 15 per cent (~2.5 million) of insured vehicles have only third-party property (TPP) insurance, which, for a portion, will include optional coverage for fire.[80]

In summary, we estimate that around 20 per cent of personal vehicles are not covered for fire risk and 25 per cent are not covered for all other disasters.

3.3 Businesses

3.3.1 Types of business insurance

Unlike household insurance, small business insurance needs are highly heterogenous, with significant variation in the size, earnings, industry, activities and structure. Small businesses can be faced with considerably different risks, and as such, the necessary insurance coverages will be heavily business-dependent.

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77 Around 15 percent of respondent households reported holding another property, with some owning multiple properties.

78 Source: anecdotal feedback and unpublished analysis of the Victorian Integrated Survey of Travel and Activity (https://transport.vic.gov.au/about/data-and-research/vista).

79 In all jurisdictions there is compulsory third-party liability cover.

80 Based on analysis of industry data (previously analysed) we estimated that 12 per cent of motor vehicle covers are TPP and less than 40 per cent of TPP covers include the optional fire and theft cover.

Due to the diversity of needs among businesses, insurers often provide small business insurance in the form of *insurance packages*, which bundle together several covers that are most relevant to a business in a specific industry or sector.

A significant proportion of businesses purchase their cover through insurance brokers, who provide advice to the business with respect to their insurance needs and facilitate and assist with the purchase of the appropriate policies. A 2015 survey of small businesses found that just over 70 per cent purchased via a broker and around 21 per cent purchased insurance directly.[81]

We understand that the level of advice provided by brokers can vary significantly: many clients use brokers to provide a high degree of service that involves undertaking a risk-assessment; whereas some clients will use brokers simply to obtain a range of quotes for a specified level of cover.

3.3.1.1 What is insured

Businesses may purchase a variety of insurance covers for their assets, income stream, public and product liability and workers compensation, amongst others. The most relevant insurance products for business in relation to this study (i.e. in response to natural disasters) are:[82]

- Material damage insurance that covers damage or loss to buildings, fixtures and fittings, office contents and stock caused by insured events and accidental damage
- Business interruption insurance that covers losses because the business cannot trade for a period of time due to loss or damage from a weather event, flood, fire or other insured interruptions.

A summary of the most relevant types of business insurance for SMEs with respect to natural disasters is provided in Table 9 below.

It appears that cover is obtainable (if not affordable) for all natural-disasters and that there are no significant gaps in the breadth of cover that is available. We received anecdotal information that the risk associated with some businesses means that it will be very difficult for them to obtain cover. For example, we understand that a recycling-centre will have great difficulty obtaining property-damage cover. The affordability of business insurance cover is another issue. This is discussed below.

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81 ICA (2015). Small businesses may also purchase cover via an insurance agent or via a franchise arrangement. In contrast around 6% of households purchase insurance by broker (ACCC, 2018, p. 186).

82 Other common covers include liability insurance covers (public & product liability, professional indemnity, workers compensation) and other non-disaster related protection covers (e.g. burglary/theft, machinery breakdown, personal accident & illness).

Table 9: Summary of business insurance cover most relevant to natural disasters

Insurance	Description
Material damage	Covers reinstatement and replacement for buildings, fixtures and fittings, office contents and stock. Sometimes referred to as 'Fires and perils insurance' or more broadly 'Business asset insurance'.
Commercial vehicle	Covers damage and theft to commercial vehicles as well as liability and legal costs for third-party property damage from vehicle accidents.
Business interruption	Covers businesses that suffer a loss because they cannot trade for a period of time due to loss or damage from a weather event, flood, fire or other insured interruptions. Some policies also cover fines, damages or penalties incurred and increased cost of operation as a result of business interruption.
Deterioration of stock	Covers businesses for the deterioration of stock of merchandise (manufactured, unmanufactured or in the course of manufacture), including materials used in their packing and raw materials. Some policies also include cover for stock in transit.

3.3.1.2 Business insurance packages in Australia and New Zealand

Business insurance products for small businesses are highly diverse. Some insurers offer insurance packages for different types of businesses or industries (e.g. office insurance packages, hotel and catering insurance packages etc...) while other insurers offer a broad range of coverages and work with businesses to create a package that includes a bundle of the most appropriate coverages. Most small business insurance packages in Australia cover damage to property and assets from bushfire, earthquake and volcanic activity (usually covered collectively in Australia) and tropical cyclone, with flood cover offered as an optional extra (except in the case of farm insurance, wherein flood events are not covered). Landslide events are typically not covered unless they follow on from a covered event such as earthquake or bushfire. Storm surge is usually not covered in these policies.

In New Zealand, material damage and business asset policies remain the most relevant form of insurance coverage in relation to natural disasters. However, unlike in Australia, natural disasters cover is typically provided as an optional extra in most small business material damage policies.[83]

Table 10 below summarises business insurance coverage under typical business insurance packages.

[83] In the AA Insurance Small Business Insurance Policy (2019), natural disasters are defined as earthquake, tsunami, volcanic activity, hydrothermal activity, geothermal activity, subterranean fire or fire occasioned by, through or in consequence of any of these perils.

Table 10: Material damage and property coverages under business insurance packages

Coverages	Bushfire	Flood	Earthquake/Volcanic activity	Cyclone	Landslide	Storm-surge
✓ = covered X = not covered O = optional C = conditional						
AUSTRALIA						
General business insurance packages (e.g. Allianz Small Business Advantage, CGU Business Pack)	✓	O	✓	✓	C	X
Farm insurance packages (e.g. Allianz Farm Pack, NRMA Farm Insurance)	✓	X	✓	✓	C	X
NEW ZEALAND						
Material damage policies (e.g. AMI Material Damages policy, AA Small Business Insurance)	O	O	O	O	O	O
Farm asset insurance (e.g. State Farm Asset Insurance, Tower Rural Policy)	✓	✓	✓	✓	✓	✓

Source: Sapere analysis of policy documents

Business interruption or business continuity insurance is typically an additional form of insurance that can be added onto material damage or property insurance. As it relates to natural disasters, business interruption insurance covers businesses for loss of income resulting from disruptions to standard business operations due to natural disasters. This is based on an evaluation of a business' "typical" turnover, and can include coverage for a range of losses including:

- loss of profit, income or revenue from business operations, rentals and accounts receivables
- increased cost of operation or working, and
- costs associated with reinstatement of documents.

Optional extras can also include coverage for interruptions due to natural disasters resulting in restricted access to and from a property and costs incurred from fines and damages. In addition, businesses can also purchase contingent business interruption coverage, which would be paid out when a business is unable to operate because of an event (such as a natural disaster) that damages the business premises of one of its suppliers or customers, thus preventing it from engaging in normal trade.[84]

[84] Macey Insurance Brokers (2015) Understanding business interruption, retrieved from: https://www.macey.com.au/understanding-business-interruption/

3.3.2 Extent of take-up

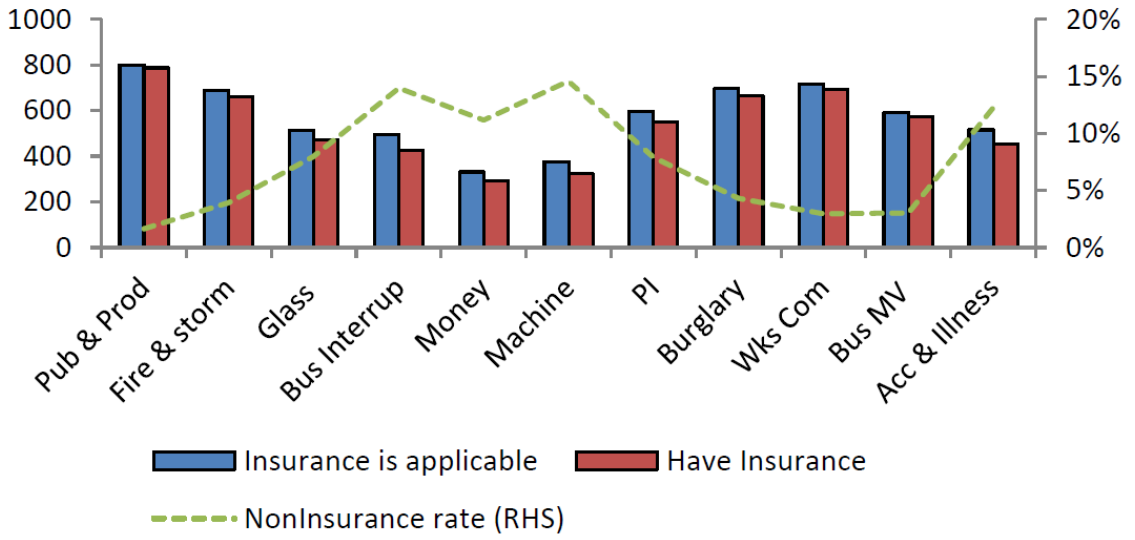
3.3.2.1 Non-farm businesses

Estimating the take-up of business insurance is challenging. A key issue is that businesses are heterogenous by nature and the needs for insurance vary greatly by business. Not all insurance covers are appropriate for all businesses. For example, some businesses (e.g. suppliers of professional services) may have negligible assets to insure. Similarly, business interruption insurance may have limited relevance for some small businesses (e.g. trades) whose business may even increase following a disaster.

The heterogenous nature of business means that it is also difficult to undertake surveys and use the results to extrapolate for the broader population. Much more so than households, businesses vary in the assets they have to insurance, the income/wealth to spend on insurance, the extent to which they are exposed to natural hazards and other characteristics that might influence demand.

Some surveys have been undertaken on the take-up of business insurance products. The most relevant of these is a study by the ICA in 2015, which followed a similar survey undertaken in 2007. The ICA (2015) commissioned a phone survey, conducted in May 2015, of 1,000 SME business covering 13 industry groups across all states and territories.[85]

Figure 5: Rates of non-insurance for small business by product type



Source: Insurance council of Australia (2015), Small business insurance survey

Figure 5 is drawn from the ICA (2015) study. It shows, for each product type, the number of respondents (out of a pool of 1000), who felt the insurance is applicable to them, the number who had that cover and, from this data, the derived non-insurance rate. As highlighted, not all product types

[85] Other surveys have included IAG (2001).

are applicable to all businesses. Around 70 per cent felt 'Fire & Storm' cover was applicable to them and 50 per cent felt business interruption was applicable.

Of relevance to natural disasters, the non-insurance rate:

- for 'Fire & Storm' was less than 5 per cent
- for 'Business interruption' was around than 15 per cent

There is also some data collected following a disaster. For example, the Queensland Government has surveyed businesses impacted by the recent Townsville floods. Only 64 per cent of survey respondents who were directly impacted had business insurance.[86] This finding suggests a higher rate of non-insurance; however, it is unclear the extent to which the sample of businesses 'directly impacted' included businesses for whom business insurance would not be appropriate.[87] The relatively high rate may also reflect the location; that is, the relatively high cost of insurance in Northern Queensland.

The post-disaster data also suggests higher rates of non-insurance for specific covers. For example:

- From the post-Townsville flood survey, less than 30 per cent of those with business insurance (18% of respondents impacted) had flood cover
- A study found that following the Christchurch earthquakes only 67 per cent of firms that had property insurance were additionally insured with business interruption insurance.[88] This figure is consistent with anecdotal evidence that we have received.

The ICA (2015) survey included asking the reason why respondents did not purchase insurance they thought was applicable. The responses (see Table 11 below) relating to 'Too expensive' and 'Risk too low/not worth it', suggest the cost of insurance is clearly a significant issue, particularly for business interruption cover.

Table 11: Reason for not purchasing applicable insurance — % of reasons nominated

Reason	Fire storm and malicious damage	Business Interruption
Too expensive	14.3%	26.9%
Risk too low/not worth it	17.9%	23.1%
Not sure if current cover picks up risk	7.1%	7.7%
Self-insured against risk	10.7%	3.8%
Not considered risk		10.3%
Too busy to arrange	3.6%	1.3%
Too difficult complicated to arrange		1.3%
Not told about the risk		1.3%
Other	42.9%	19.2%

86 There were 617 responding businesses in the post-Townsville report. 74% of respondents had been directly impacted. The survey focussed on four main types of insurance being: Building and Contents, Tools and Equipment, Stock and Business Interruption.

87 For example, a tradesperson whose home or vehicle were damaged may class themselves as being directly impacted but not consider business insurance as being appropriate.

88 Poontirakul et al. (2017, p. 16).

Source: ICA (2015), Note: sample sizes are small.

3.3.2.2 Farm cover

There is limited information on the extent of take-up of farm insurance policies. The ICA reported that a number of its members recently contributed policy data that starts to identify, in aggregate, the extent to which farm operations currently insure. Based on the information collated, the level of take-up appears high.[89]

3.3.3 Underinsurance and quality of cover

Underinsurance can refer to businesses having an insufficient sum-insured and/or limits to their cover.

An insufficient sum-insured with regards to business insurance may, in large part, be due to a misunderstanding by business owners of how the sum-insured affects the claims amount. As explained by LMI,[90] 'If the assets or insurable gross profit are not insured for their full value, a business insurance policy will typically treat the policy holder as being a co-insurer for all claims over 5% or 10% of the declared value.' However, business owners may intentionally select a low sum-insured to reduce the premiums on the incorrect assumption that by doing so they only lose out if the claim exceeds the sum insured.

The ICA (2015) survey captured some information on the extent to which businesses' sum-insured were adequate. The survey reported that 10.4 per cent of respondents were knowingly under insured (that is, the sum insured was less than the asset value).

A related issue is that some businesses are underinsured to the extent that they have limits on their policy. This is particularly relevant to business continuity cover, whereby businesses have a choice as to the period for which cover applies (the Indemnity Period). For example, some businesses with business interruption cover may only have cover for 3 or 6 months, whereas—as is being evidenced from the Townsville storms and Christchurch earthquakes—the period of disruption can last more than 12 months.[91]

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89 The ICA reported that Australia-wide there are an estimated 299,500 farm insurance policies in place for a sum-insured of $153 billion, an average of $500k per farm. When it comes to crop cover, there are an estimated 143, 500 policies in force for an aggregate sum-insured of $5.6 billion. These estimates are likely to not represent the full extent to which farmers insure themselves as some will have placed business with overseas underwriters.

90 See https://www.lmigroup.com/RiskCoach/Calculators/underinsurancecalculator.aspx?access=adroit. Many insurance policies allow a percentage of tolerance in getting it right. This is typically 15% (85% co-insurance) or 20% (80% co-insurance). There is no tolerance with some business interruption cover such as a standard Industrial Special Risks policy.

91 Muir-Woods (2012) reports of 'threats of litigation by commercial organizations against their insurers on the basis that they were encouraged to purchase only a year of BI coverage'

Based on post-disaster information, underinsurance due to insufficient sum-insureds or policy limits may be reasonably common. Of the respondents to the Townsville survey, only 13 per cent of those directly impacted (~20 per cent of those insured) said they were fully insured.

There are also reports of significant levels of underinsurance following the Christchurch earthquakes.

- Based on a sample of insured business, Poontirakul et al. (2017, p. 16) report that:

  > *Notably, only half of the sample believed their insurance was adequate. Of those that had filed a claim, nearly 45% reported they received almost full payout (defined as >80%) on their filed claims. But, only 38% of this group which filed claims had responded saying they believed their coverage was adequate given the amount of damage and loss they experienced.*

- Muir-Woods (2012) provides anecdotal evidence that, for commercial claims, sum-insureds were too low and did not factor in the high-cost of demolition and debris removal and the escalation of professional fees.

Research following the Christchurch earthquakes also helps highlight the importance of the quality of cover. Poontirakul et al. (2017) found that the recovery of firms following the earthquakes depended significantly on receiving prompt and full payments of their claims and that firms whose payments were not settled promptly performed no better than those without insurance.

3.4 Other parties

3.4.1 State government

State governments run self-insurance schemes that provide property damage and other cover for state government agencies and other eligible participants.

An example is the NSW Treasury Managed Fund (TMF).[92] The TMF provides broad coverage for a range of risks including damage to property and vehicles, consequential losses (e.g. increased cost of operations), as well as other non-disaster related events such as workers compensation. Participants to the scheme make annual 'deposit contributions' based on a combination of industry benchmarks, agencies' risk exposure measures and claims history.[93]

The TMF is backed by reinsurance cover obtained on the international market. We understand that the reinsurance that TMF obtains, and not the TMF itself is considered, insurance under the Disaster Recovery Funding Arrangements 2018 (DRFA).

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92 See https://www.icare.nsw.gov.au/government-agencies/our-funds-and-schemes/treasury-managed-fund/

93 For workers' compensation and motor vehicle policies, the contribution methodology incorporates a hindsight adjustment mechanism.

The TMF cover is broadly promoted as having a number of benefits including:[94]

- being "… simple, all-encompassing, continuous, and flexible at a significantly reduced cost"
- no complex insurance documents full of hazardous "fine print"
- exclusions are limited to issues agencies can directly control
- no possibility of membership refusal because of adverse claims history or high-risk activities.

TMF and reinsurance arrangements cover most property assets including bridges; but most roads are not insured and, consequently, are not subject to risk-based premiums. We understand the schemes are broadly similar across jurisdictions.[95]

The lack of insurance for road assets was considered in the Productivity Commission's (PC 2015) review of national disaster insurance arrangements. The PC (2015, pp. 24, 38) raised concerns that 'there are weak incentives for states to take out insurance for essential public assets.' and noted that:

- 'the vast majority of Australian roads (including local government roads) are uninsured' and that 'essentially, state and local governments receive zero-cost natural disaster insurance'
- commercial insurance is often not available for road assets because of uncertainty about the level of exposure to natural disaster risks, the difficulty in distinguishing maintenance from reconstruction costs, and the fact that some roads are damaged on a repeated basis.
- most state, territory and local governments have not fully explored the use of non-traditional[96] insurance instruments for insuring roads.

The PC recommended a reduction in the extent of Australian Government support, including a higher initial threshold level (a doubling to 0.45 per cent) and removing the upper tier. However, the PC also recommended enabling "the state and territory governments to purchase 'top-up' fiscal support at an actuarially fair price" and Australian Government support for the betterment component of reconstruction (where appropriate).[97]

The above recommendations by the PC were not adopted by the Government and, consequently, the concerns raised by the PC have not been addressed.

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94 NSW Treasury Circular 12/12.

95 Other schemes include: Queensland Government Insurance Fund (QGIF); Victorian Managed Insurance Authority (VMIA); Insurance Commission of Western Australia (ICWA); SAicorp, the captive insurer for the Government of South Australia; and, the Tasmanian Risk Management Fund.

96 Non-traditional products are products such as "parametric insurance (where payouts are based on a certain 'trigger', such as a set level of rainfall, rather than on losses of the policyholder)" PC (2015, p. 24).

97 The PC (2015, p. 38) recommended that 'Where asset management plans at the local, state or territory level pre-identify and cost betterment of assets (improving asset resilience to natural disasters), the Australian Government should share 50 per cent of the betterment component of reconstruction costs following damage from a (eligible) natural disaster.'

3.4.2 Local Government

Councils own a range of assets that are susceptible to disasters including roads, buildings, vehicles, and other built assets.[98] Some of this infrastructure would be considered essential to the community.

Local governments obtain disaster cover for these assets through private insurance markets or—more commonly—by participating in a self-insurance mutual. The core elements of such mutual schemes are as follows:

- The schemes are state-based,[99] and in some cases, 100 per cent of councils participate in the scheme. In NSW, there are two such schemes.
- The schemes are supported by reinsurance[100] and, in some cases, additional State government indemnity, should reinsurance limits be exceeded.
- The councils nominate which assets are to be covered. With the exceptions of roads, culverts and non-critical bridges, most council assets are covered. Other typical exclusions include council assets subject to damage from actions of the sea.
- Contributions to the scheme are based on the number, value and type of assets covered, at a rate that reflects the cost of reinsurance.

Table 12: Local government insurance schemes

State/Territory	Mutual
NSW	Statewide mutual https://www.statewidemutual.com.au a 'self-insurance mutual' which is backed by reinsurance placed through local and international underwriters. CivicRisk Mutual is a mutual of 16 NSW councils with a combined value representing 20% of total local government expenditure and 29% of the population of NSW. http://civicriskmutual.com.au/about_us
Queensland	Local Government Mutual Services (https://lgms.jlta.com.au/) runs a self-insurance scheme called LGM Assets (https://lgms.jlta.com.au/pages/public/LGMA_Public)
Victoria and Tasmania	JLT (Municipal Asset Protection Plan) Discretionary Trust Arrangement (JMAPP). JMAPP combines the elements of a Discretionary Trust with conventional property damage/ business interruption insurance.[101]
South Australia	Local Government Risk Services was established to manage and service the insurance and risk management needs of Local Government in South Australia. It operates the LGA Asset Mutual Fund, which provides local government members broad cover of their physical assets integrated with a specialised claims management system. https://www.lgrs.com.au/

98 Local governments (councils) are required by legislation to maintain a register of assets and have them periodically valued.

99 An exception is the JLT managed scheme that covers both Victoria and Tasmania.

100 In some cases, this may be further supported by State governments

101 https://www.au.jlt.com/what-we-do/our-specialties/public-sector/mutual-benefits-from-jlt/jmapp/jmapp

Western Australia	LGIS is a not-for-profit industry-based self-insurance scheme owned by over 145 Western Australian Local Governments https://www.lgiswa.com.au
NT	A mutual scheme (managed by JLT) has been recently established

3.4.3 New Zealand

In New Zealand, local authorities have responsibility for physical infrastructure relating to roads, transport, water supply and wastewater and other physical assets such as community assets (e.g. recreation facilities).

Prior to the Christchurch earthquakes, local authorities all participated in the Local Authority Protection Programme Disaster Fund (LAPP), a mutual pool created by local authorities to cater for the replacement of infrastructure following catastrophic damage by natural disaster. The earthquakes in Canterbury in 2010 and 2011 exhausted the LAPP fund and led to many local authorities exiting the fund and instead obtaining cover in private insurance markets. Currently 22 of the 78 local authorities in New Zealand are members of LAPP.[102]

Funding for the storm- or earthquake-damaged roads and bridges comes from the National Land Transport Fund (NLTF) managed by the New Zealand Transport Agency (NZTA). Of note, contributions to the National Land Transport Fund (NLTF) are unrelated to the geographical location of risk.[103]

3.5 Comparisons with elsewhere

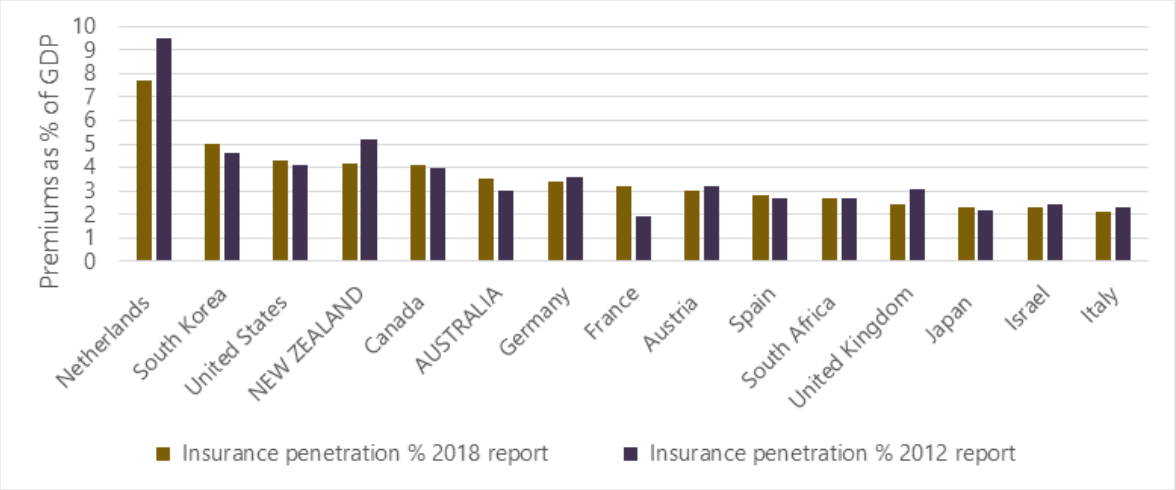
The penetration of natural hazard insurance in Australia and New Zealand appears relatively high compared to many other international jurisdictions. International comparisons are, however, difficult as there is little information collected, and analysis conducted, that is common across multiple countries.

A simple commonly-used penetration measure (to compare countries) is the expenditure on premiums as a percentage of Gross Domestic Product (GDP). As illustrated in Figure 6 below, this measure suggests that Australia and New Zealand have relatively high measures of insurance penetration compared to most comparable countries. However, the variation may be explained by a range of factors, including differences in the value-at-risk relative to GDP and the extent of disaster risk.

[102] http://www.lapp.org.nz/

[103] New Zealand Productivity Commission (2019, pp. 34–36, 226).

Figure 6: Non-life insurance penetration by country



Source: Lloyds (2018). Selected countries only.

For the purposes of policy analysis, it is more helpful to compare penetration for different schemes and risks. In contrast to Australia, there are Government-backed insurance schemes in many international jurisdictions including in the United States, New Zealand, Japan, France, Spain, Turkey, Austria and the United Kingdom.

As summarised by the Productivity Commission (PC 2014), the international experience reveals significant disadvantages to such schemes and that they 'have often failed to meet [their] objectives'.

A key issue is that the schemes generally limit risk-based pricing (either by regulation, government subsidy, and/or lack of competition), which in turn weakens the price signals for mitigation. Furthermore, schemes can crowd out private initiatives and have, 'on a number of occasions', led to governments having to bail out the schemes.

Of note, the take-up rates in many of the international schemes has been low (see Table 13)—for example 15 per cent of properties in some high-risk areas of the United States have flood insurance.

The low uptake rate in some of the international schemes relative to Australia and New Zealand may be due to a range of factors. A key factor appears to be the extent to which catastrophe insurance cover is bundled with other risks. For example, take-up rates are high in New Zealand (earthquake) and England (flood) where the cover is bundled with other risks and very low in the US and Japan where the cover is separate. The PC (2014, pp. 560–561) suggest a contributing factor may be the extent of Government assistance to those without insurance. Another factor is that some government regulated scheme products are restrictive in their cover. [104]

The low take-up rate in government schemes may in part be due to pricing regulations and a lack of competition that limit the extent of risk-based pricing—which can lead to adverse selection and moral hazard and poor value for consumers. For example, Michel-Kerjan et al. (2015) estimates that due to cross-subsidies the NFIP charges prices that are more than 15 times the pure premium in some areas.

[104] McAneney et al. (2016) note that 'High deductibles (10% or 15% of the sum insured) and premiums may be a contributing factor' for the low take-up of the California-Earthquake scheme.

Premiums may also not represent value for consumers, who are not rewarded for premium discounts for mitigating activities.

Table 13: International disaster insurance schemes

Scheme	Take-up rates	Notes
United States – Flood	Varies: As low as 15% in high-risk locations	• Provided through the National Flood Insurance Program (US) • Mandatory for properties with mortgage from a federally regulated or insured lender, and those in 1-in-100-year flood risk areas. • Pricing subject to significant pricing distortions (Bin et al. 2019).
California– Earthquake	~12%	• Provided via the California Earthquake Authority
FloodRe (UK)	High >75%	• Insurers pay a levy, which will be pooled to provide capped premiums to households in high-risk areas
Japan – earthquake	~30% residential properties	• Earthquake Insurance in Japan covers earthquake, volcano and tsunami risk. It is a separate policy sold to those with fire insurance and reinsured by Japanese Earthquake Reinsurance Company • Premium rates are centrally set but vary by the structure and location (prefecture) of building. Some discounts apply.
New Zealand – earthquake	95% (estimated)	• Scheme is integrated with residential policies that cover fire risk.
Austria – Flood	In 2010, as low as 10–25%	• Private market provision
France (multiple hazards)	High	• Provided via NatCat, a compulsory extension of cover on property insurance contracts. Funded with a flat 12% levy.
Germany – Flood	Low ~40% (2014)	• Private market provision. Notable provision of ex-post disaster relief by German Government

Source: US & California — Bin et al. (2019), McAneney et al. (2016); Germany & France — Le Den et al. (2017); Japan — Guy Carpenter (2016); Austria & UK — Hanger et al. (2018).

4. Data and information

4.1 Information for insurers

As discussed in Section 2.2.3, whether a natural disaster is insurable largely depends on insurers having information to analyse and price the risk.

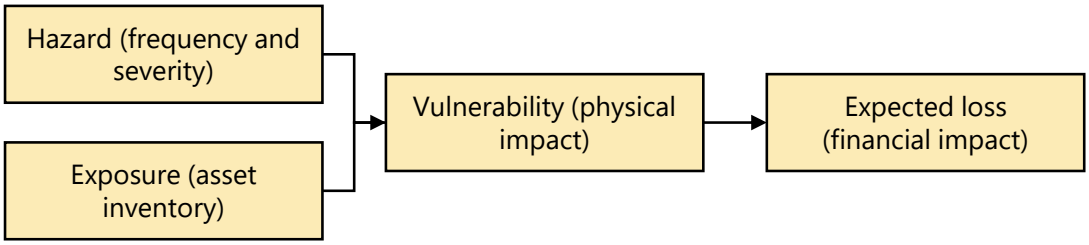
The insurability of disaster events appears to have been increasing over time as a result of insurers having improved information on risks. Historically, flood cover was often excluded due to the lack of flood information available to insurers and the consequential risk of adverse selection. The release and improved management of flood maps led to the widespread availability of flood insurance in Australia. Similarly, other difficult-to-insure events such as landslip may become increasingly insurable with improved localised information.

4.1.1 Current information sources

The process of estimating expected loss from catastrophes is illustrated in Figure 7 below. It involves obtaining, analysing and combining different sets of information, including information on:[105]

- the hazards—the frequency and severity of hazards by geographic location
- the exposure—the inventory of the assets at risk (e.g. buildings, infrastructure, agriculture etc.)
- the vulnerability—the impact of the hazards on the exposed assets.

Figure 7: Process of using climate models to develop expected loss-estimates



Insurers make use of a range of data sources to estimate natural-hazard risk. These include privately developed services (e.g. the NatCatSERVICE from Munich Re, a comprehensive natural catastrophe loss database)[106] and a range of government sources including local and state governments and government agencies (in particular, the BoM and Geoscience Australia, GA). Some of the publicly available data sources by risk are described in Table 14 below. The ICA maintains the ICA DataGlobe (see Box 3 below), which provides hazard data for most Australian properties.

The insurance industry has taken a coordinated effort in building information on flood risk. State and local governments have the primary responsibility for assessing and mapping the flood risk for their

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105 Adapted from Kunreuther & Michel-Kerjan (2007) and 'What is Catastrophe Modeling?' https://www.rms.com/blog/2015/06/22/what-is-catastrophe-modeling/

106 NatCatSERVICE is advertised as—Comprising some 37,000 data records—"the most comprehensive natural catastrophe loss database in the world. Approximately 1,000 events are recorded and analysed every year." https://www.munichre.com/australia/australia-services/natcatservice/index.html

communities.[107] The ICA incorporates flood mapping data into the National Flood Information Database (NFID) (part of the ICA DataGlobe), which houses all available flood maps. Flood maps are being continually updated and incorporated into the NFID. All states—with the exception of South Australia—have been able to contribute detailed comprehensive flood data that has been incorporated into the NFID that previously was only held by local councils.

Table 14: Public information on natural hazard risks

Risk	Publicly available information
Flood	• Flood data is largely collated by the states, particularly new flood studies. • Insurers have access to the National Flood Information Database (NFID) organised by the ICA. • Geoscience Australia (GA) provides the Australian Flood Risk Information Portal, which 'hosts data and tools that allow public discovery, visualisation and retrieval of flood studies, flood maps, satellite derived water observations and other related information'.[108] • Some state governments also provide state specific flood mapping information (e.g. Queensland FloodCheck, NSW flood data portal).
Bushfire	• Each state provides mapping tools that enable users to check the bushfire risk.[109]
Earthquake	• GA details and summarises information for recent earthquakes that have occurred across Australia and NZ, including off-shore.[110] • GA also develops the National Seismic Hazard Assessment for Australia, which 'defines the level of earthquake ground shaking across Australia that has a likelihood of being exceeded in a given time period.'[111]
Coastal hazards (erosion and storm tide inundation)	• GA publishes the Smartline Geodatabase. OzCoasts and the Coastal Risk Australia publish publicly accessible websites that provide information on coastal flooding from climate change and other risks based on this data and other sources.[112] Some states also provide information on coastal hazard risk.[113]

107 This information is used for infrastructure and town planning, and to assist with devising strategies to lower the risk of flood for existing communities and assets.

108 https://afrip.ga.gov.au/flood-study-web/#/search.

109 Examples include the bush fire prone land mapping tool provided by the NSW Rural Fire Service (here), and other more general mapping tools (e.g. https://maps.sa.gov.au/SAPPA/ in South Australia).

110 https://earthquakes.ga.gov.au/

111 http://www.ga.gov.au/about/projects/safety/nsha

112 See https://ozcoasts.org.au/about/ and http://www.coastalrisk.com.au/ GA also publishes the Smartline Geodatabase https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/104100

113 For example: Queensland (https://www.qld.gov.au/environment/coasts-waterways/plans/hazards), NSW (http://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=SEPP_CoastalManagement)

Cyclone	•	GA provides the Tropical Cyclone Hazard Assessment (TCHA), which 'defines the severe wind hazard posed to Australia based on the frequency and intensity of tropical cyclones making landfall around the Australian coastline.' The TCHA is targeted to 'emergency managers, town planners and infrastructure owners'.
Tsunami	•	GA provides the Probabilistic Tsunami Hazard Assessment (www.ga.gov.au/ptha), which models the frequency with which tsunamis of any given size occur around the entire Australian coast.

Box 3: ICA DataGlobe and other sources

ICA DataGlobe

The primary purpose of the ICA DataGlobe is to provide a communications resource for the ICA and member companies that are involved in dialogue with the community and governments about the relationship between the cost of insurance cover for individuals and their exposure/vulnerability to natural perils.

The DataGlobe provides visualisations of collected hazard data (Earthquake, Bushfire, Flood, Cyclone, Hail, Storm etc) that can be used to provide a meaningful insight into natural perils, risk-based insurance premiums and the mitigation measures that may reduce the impacts of disaster in specific locations. The ICA DataGlobe provides hazard data for 14.1 million Australian homes.

Source: https://www.icadataglobe.com/access-raw-hazard-datasets

The industry is also continuing to work with local governments to improve the release of information. The ICA runs the Property Resilience & Exposure Program (PREP),[114] which it describes as 'an alignment tool for local governments and the insurance industry to ensure that local premiums reflect the best available information, and not alternative sources.'[115]

However multiple issues remain. Insurers do not have access to a range of data that may be used to assess and price risk. In a recent submission on 'Australian Government Data Sharing and Release Legislation', the ICA (2018b) described several data gaps relating to the following.

- High-resolution elevation/terrain data—Issues include data gaps in coverage in low-density areas and fragmentation in the way data is collected and published.

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114 https://www.icadataglobe.com/ica-resilience-program

115 'PREP provides local government and the insurance industry with more robust information on the resilience of housing stock. It enables councils and shires to engage with the insurance industry on the issue of insurance affordability, where the primary drivers may be poor-quality hazard data, or a lack of information on development controls and existing buildings. PREP seeks to improve the alignment between the data and hazard mapping relied upon by insurers to price risk, and the information local governments harness for development control and town planning purposes.' https://www.insurancecouncil.com.au/affordability.

- Historical weather data—Issues include some data being unavailable or expensive to obtain relating to historical radar, geostationary satellite imagery and historical flood/tide data.[116]
- Building attribute data—The ICA recommends public release of GeoScape,[117] which gives an accurate location for buildings, roof area, roof complexity, and estimated floor height.[118] The ICA argues that the data is important for assessing flood and storm surge risk and estimating sums-insured.[119]
- Building standards and zoning—The ICA recommends that information about the rebuilding standards applicable in each specific location be consolidated and made publicly available
- Flood data—Issues include:
  - Some old studies (typically held by local governments) are not digitised
  - Some local governments release only a small section of their data (e.g. they may just release 1-in-100-year flood maps and not maps that include more frequent and extreme events).

Other industry participants reiterated support for release of the GeoScape data and raised other issues/opportunities including that:

- a national digital (and quality-controlled) dataset of coastal hazard lines/zones (currently held at local or state levels) would be 'very useful'.[120]
- consistent flood model outputs for various climate scenarios, 'would provide very important insights into safeguarding people and the built environment'
- there is value in updated topographic data as 'most of the lidar [Light Detection and Ranging information] is now 10 years old.'.

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116 The ICA (2018b) states 'Most basic historical weather data is readily available with nominal fees to cover the cost of data supply. The gaps are historical radar, geostationary satellite imagery and historical flood/tide data. In some cases, these datasets are available but expensive (e.g. radar). The historical flood height and tide gauge data is held by the BoM but actually owned by many other agencies (e.g. local water authorities, councils, state governments etc.) which makes it difficult and expensive to access. Other historical weather data from BoM (e.g. a recent reanalysis dataset funded by the various fire agencies) may be available through negotiation, but the existence of such datasets is not publicly advertised.'

117 GeoScape (https://geoscape.com.au) is released by PSMA Australia for a fee. PSMA is a commercially operating, for-profit company jointly owned by the nine governments of Australia 'to develop and facilitate the broadest possible access to authoritative national spatial datasets in order to deliver benefits for all Australians.' https://psma.com.au/wp-content/uploads/2019/07/psma_shareholders_statement_of_expectations.pdf

118 The ICA also recommended release of disaggregated (i.e. per-building) data from NEXIS (National Exposure Information System), a dataset compiled by Geoscience Australia. NEXIS provides aggregated information (at existing administrative or geographic boundaries) on estimates of the value of buildings and contents and information about property attributes such as age and construction type. The ICA argues that per-building data would be very useful in quantifying natural hazard risk. However, we understand GA is unable to release this information due to licence conditions.

119 ICA (2018b) states 'Accurate building location is very important for understanding flood and storm surge risk, as most address databases assume that the building is in the middle of the land parcel; this is often not true on large or rural land parcels, and can result in over-estimated flood risk. Other attributes in GeoScape could be useful for calculating accurate sum insured for buildings, or for identifying the presence/location of outbuildings on rural properties.'

120 Issues raised included difficulties in keeping track of defences and their effectiveness.

Other feedback received noted that some information desired by the industry may not currently exist or be of the quality required, and more work needs to be done between government and industry to obtain a shared understanding of the needs and priorities.

Greater and improved provision of information to the industry would have several efficiency benefits. These include:

- more accurate risk reflective pricing, which would:
  - provide a better signal for mitigation and more efficient asset decisions
  - reduce risks of adverse selection
- improvements in the quoting process included more efficient information gathering and improvements in estimates of the appropriate sum-insured
- reducing the cost to insurers of obtaining information, which would reduce the administration costs associated with providing insurance
- reducing the loss uncertainty and the associated costs with maintaining prudential reserves.

However, there are some potential issues (in addition to the cost of releasing the information) with the release of additional information to assess risk. Some councils have been reluctant to release detailed flood mapping data because doing so may impact property values and render local councils at risk of legal action.[121] There are also equity implications, with more granular risk-based pricing leading to premiums increasing for some owners and decreasing for others. Potentially, assistance programs could help mitigate the impact on high-risk properties. Regardless, given the potential significant efficiency benefits, it would be appropriate that an evaluation be undertaken to assess whether greater release of information is in the societal interest.

Recommendation 1

Governments should evaluate the benefits to releasing further information to analyse risks and do so where it is in societal interest. The evaluation should include the efficiency benefits to insurance markets.

4.1.2 Climate change and future risk information

4.1.2.1 The need for climate modelling

Climate change is expected to have implications for the frequency and severity of natural disasters, which in turn will have impacts on the expected future losses associated with these events.

As insurance is (predominantly) written on a yearly basis, *prima facie* it appears insurers are reasonably well placed to adapt to a changing climate. As evidence of changing climate and hazard risk emerges, insurers can modify the premiums charged to reflect the changing risk.

However, the high-severity, low frequency nature of catastrophe events means that it is difficult to identify trends and risky for insurers to rely on historical event data. Consequently, insurers are likely

[121] NDIR (2011, p. 70); PC (2012, p. 16); PC (2014, Vol. 1, p. 188).

to require climate modelling (in combination with historical event data) to estimate and reduce the uncertainty regarding the *current* hazard risk and consequently expected losses. [122]

Insurers also have an interest in climate modelling to estimate *future* hazard risk. Information on future hazard risk may be used in analysing future portfolio risk, decisions on marketing and underwriting, guiding company strategy and long-term investment decisions. Furthermore, the insurance industry has an interest in ensuring that development does not occur in high-risk areas as these areas are likely to face heightened premiums in the future, which could result in insurance affordability issues for these areas (ultimately leading to under- or non-insurance and increased pressures for regulatory intervention).

Asset owners and their lenders have a larger stake in future hazards and consequently should have a greater interest in understanding the implications and impacts of changing climate risk. However, much of the loss modelling capability rests with the insurers and it is difficult for asset owners to assess how insurance costs would change over time.

More broadly, in response to the growing interest of investors and other stakeholders, insurers along with other companies and organisations are increasingly seeking to report on their climate-related financial disclosures in mainstream filings and, in doings so, adopting the voluntary recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD).[123] Such reporting is generating increasing demand for climate risk modelling.

4.1.2.2 The state of climate modelling

Climate models provide a foundation for the modelling of future loss. There are several public climate modelling projects that provide outputs that are used as a basis for estimating changes in hazard risk in Australia (see Box 4). Several firms are using the outputs of these climate models combined with other information to develop projections of potential hazard risks and losses into the future.[124]

Despite best efforts, there remains considerable uncertainty in the modelling of the climate change impact on hazard risk. This uncertainty comes with a cost. From an insurance perspective, the greater uncertainty, the more reserve capital insurers (and reinsurers) will require and consequently, the higher the premiums charged. More importantly, uncertainty in future hazard risk is a cost to those making asset investment decisions (e.g. in terms of where and what to build and what mitigation measures are put in place). For example, in the absence of better climate modelling, asset investors may make poor decisions including a lack of investment due to an overestimate of the hazard risk and/or over investment where hazard risk has been underestimated.

We understand that significant improvements in the modelling of the projected impacts of climate change on natural hazard risk in Australia could be made with additional investment in climate modelling (see Box 4). Such improvements would have a range of benefits including reducing

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122 UK Institute and Faculty of Actuaries (2019).

123 https://www.fsb-tcfd.org/

124 For example, Informed 365 (https://www.informed365.com/), CLIMsystems (https://www.climsystems.com/), ClimateRisk (https://www.climaterisk.com.au/).

uncertainty for insurers and asset investors. As insurance is written and priced on an annual basis, we expect the primary benefit of improved climate modelling will be in guiding better asset decisions. Nevertheless, it is important that such benefits are considered in the evaluation of the investment in modelling capability.

Recommendation 2

A business case for greater public investment in improved climate modelling should be developed, including consideration of the potential benefits to improved investment decisions as well as benefits to the insurance industry.

Box 4: Climate modelling in Australia

Climate modelling begins with internationally developed Global climate models (GCMs).[125] The GCMs can be used as a basis for predicting local impacts; however, they have limited resolution.[126]

Regional Climate Models (RCMs) are run only over a smaller area and can therefore have higher resolution. RCMs are most commonly used for climate modelling projects in Australia. RCMs are most commonly used in projects undertaken for Australia that are used for modelling of disaster impacts.[127]

A further level of sophistication/granularity involves the use of Convection Permitting Models (CPMs), which can often reach a level of modelling resolution of below 2 km. CPMs are used in weather forecasting and can more accurately be used to forecast extremes, such as the likelihood of floods and tropical cyclones.

Non-CPM models may not provide good estimates of the extreme precipitation events, as they were not originally designed with this purpose in mind. CPMs have been found to provide differing results to RCMs for a range of climate outcomes particularly relating to precipitation events.[128] Consequently, CPMs are preferred to model high-impact low-probability (HILP) events associated with floods and cyclones.

CPM capability can be implemented using the Australian Community Climate and Earth System Simulator (ACCESS);[129] however, it is computationally very expensive. Further investment would be required to develop the CPM capability.

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125 A climate model is a mathematical representation of the climate system. There are many GCMs; 48 were incorporated in the most recently completed phase of the Coupled Model Intercomparison Project (CMIP5) (assessed in the IPCC Fifth Assessment Report, AR5).

126 The GCMs most recently used in CMIP5 have a finest horizontal resolution in the atmosphere of around 70km, but the average is about 200km.

127 These include Australia-wide projections produced for the Climate Change in Australia 2015 report (CSIRO and Bureau of Meteorology, 2015) and regional projects such as the NARCliM framework used to model south-eastern Australia https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/About-NARCliM

128 Kendon et al. (2017) provide analysis to identify how results from CPMs differ to results provided by coarser-resolution RCMs.

129 ACCESS—which is described as Australia's next generation climate model—was developed by CSIRO and the BoM to meet a number of purposes. See https://www.csiro.au/en/Research/OandA/Areas/Assessing-our-climate/ACCESS.

Further work may also be required to improve the application of the climate-risk modelling. Given the significant uncertainty and the technical nature of the modelling, it will be difficult for users to assess the quality of projections produced by the modelling of different parties.[130]

Potentially, guidelines (e.g. in terms of transparency of documentation and assumptions) may help users to assess the quality of projections. In Australia, the increased interest in the TCFD recommendations has led to the development of an industry-driven 'Climate measurements standards initiative' that aims to develop standards as to how climate risks are developed and reported.[131]

4.2 Information available to consumers and other stakeholders

Consumers and other stakeholders (e.g. councils, developers, investors) need information on risks and insurance to assist with:

- making asset investment and planning decisions, including where to purchase and what to build
- purchasing the appropriate type and level of cover for their level of risk
- mitigation activities to address their relevant risks.

For investors, information on risks and insurance prior to asset investment decisions is particularly important. We expect that households who consider the risks and insurance costs prior to purchasing an asset are less likely to be in financial stress and less likely to opt out of insurance due to budget pressures.

Having consumers consider the risks and insurance costs prior to asset decisions should also lead to more efficient asset decisions in the long term. We would expect this would produce a price signal on the perceived value of locations. If consumers pay less for properties located in high risk locations, then land developers will be incentivised to develop land in lower risk locations instead.

4.2.1 Information on risks

For most insured parties (households, businesses, governments and other organisations), the information available on natural disaster risk is more limited than for insurers.

In some jurisdictions, information about natural hazard risks associated with properties is required to be made available to vendors to disclose to potential buyers. The vendor-disclosure requirements are most stringent in NSW and Victoria, where vendors are required to provide information about the flood, bushfire and landslide risks. In other jurisdictions there are minimal requirements.[132] As noted in

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130 We received anecdotal concerns over the quality of some projections.

131 For example, standards might establish agreed-upon definitions (what is long-term), scenarios to be used in reporting, downscaling processes applied, etc.

132 The PC (2014, p. 141) notes there are no requirements in Queensland, South Australia, Tasmania and the ACT. In the NT, flood and storm-surge risks must be disclosed and in Western Australia a voluntary framework exists.

a submission to ACCC inquiry 'it's possible to buy (and equally, rent) a property in Queensland without having any idea of its propensity to flood or its proximity to sea level and thereby storm surge risk.'[133]

In New Zealand, investors can obtain a Land Information Memorandum (LIM) from their local council, which will typically includes information relating to hazards such as erosion, subsidence and flooding etc. However, the value of LIM is questionable—Wellington City Council (2019, p. 6) concludes that 'The LIM is seen as a mechanism to discharge a Council's legal obligations, rather than a mechanism to communicate risk to a property owner.'

Information on natural hazard risks is publicly available from some government (or government sponsored) sources as described in Table 14 on page 42.[134] Some local governments may also provide additional natural-hazard information on request. However, the release of natural-hazard information is controversial. While the release of such information is of clear benefit to buyers, vendors may object on the basis that it can adversely impact on property values.[135] The ICA (2018b, p. 13) notes that individual insurers may also be reluctant to share the risk information they have obtained with consumers due to data-sharing restrictions and limitations on the provision of financial advice.

To help reduce the information challenges for consumers, the ICA has recently released the *MyHazards App*—an application that provides users with a summary of the potential risks facing any address.[136] The application currently summarises five hazards for each land parcel, Storm, Stormtide, Cyclone, Flood and Bushfire. Earthquake and Hail are in development. This information can differ to the high-resolution information used by some insurers and it is provided as a guide only. It is intended also to encourage the property owner to seek out more accurate information where necessary from the government authority responsible for hazard management in their area.

Consumers can also obtain insurance quotes prior to purchasing a property. However, consumers also face the risk that the insurance premiums that they will pay in the future increase significantly due to changes in risk or risk assessment. Consumers may also experience large premium increases upon annual renewal because their initial quote/premium was from an insurer who had mispriced the risk and was artificially low.[137] To reduce this risk, consumers may seek a range of insurance quotes and consider that the lowest quotes may not be indicative of premiums in the future.[138]

There is some information available for asset owners on the risks associated with climate change. Some private companies market services to asset owners (predominantly utility providers and

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133 ACCC (2018, p. 178).

134 A summary of some tools is provided in a recent blog post. https://www.domain.com.au/advice/tools-for-home-buyers-to-assess-climate-change-risks-870093/

135 The issue is discussed by the PC in its 2014 review of Barriers to effective adaptation, the PC (2014, pp. 141–142).

136 https://www.icadataglobe.com/ilead

137 This can occur as a result of different insurers having different sets of information and undertaking different analysis to price risk.

138 See the discussion of 'Price Sheer' in ClimateRisk (2014).

commercial entities) to assess their climate risk.[139] There is also some public information available to all consumers that may be used to assess future risk associated with climate change.[140]

However, as discussed, there is substantial uncertainty over many of the impacts of climate change[141] and there is currently no market through which investors might hedge their future exposure to climate risk. For example, an investor cannot hedge against the risk that the sea level rise is higher in 20 years than their default projection.

Markets to enable hedging of future climate risk may be possible. For example, farmers can currently purchase weather derivative products that provide a pay-out should rainfall be less than expected in the short-term (e.g. in the following year). Conceivably, similar products might be developed that provide a financial hedge over a measure of climate change for the longer-term. While it seems unlikely that markets would provide such products over a long-period, markets might be established with government support.[142] As well as providing a vehicle for investors to hedge their exposure, such a market could provide pricing signals for future climate risk.

Recommendation 3

Governments should investigate the potential for the development of long-term financial products that can be used to price and hedge climate risk.

4.2.2 Use of risk information

There is mixed evidence as to the extent to which consumers consider risk information prior to acquiring or moving into a property. Survey evidence suggests that a significant proportion of buyers do not adequately consider the risk prior to purchase of a property.[143]

However, as home-lenders will require the borrower to purchase insurance, potential borrowers are likely to obtain insurance premium information prior to settlement. The ACCC (2018, p.178) notes an example of a would-be-purchaser seeking to avail themselves of the contract during the cooling-off period having subsequently received quotes for building insurance they decided would not be affordable.

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139 For example, Informed 365 https://www.informed365.com/, CLIMsystems (https://www.climsystems.com/), ClimateRisk (https://www.climaterisk.com.au/).

140 These include CoastAdapt (https://coastadapt.com.au) developed by NCCARF with funding from the Australian Government. CoastAdapt provides information about climate change, its impacts and response options. It includes information by council area including, for example, inundation maps under different climate scenarios.

141 Bruyère et al. (2019) provide a useful summary of the potential impacts and the level of confidence. While there is reasonable confidence in estimates of some impacts (e.g. sea-level rise in the medium term), there is less confidence (more uncertainty) in many estimated impacts (e.g. frequency of storm surge).

142 For example, to support such a market a government might issue a long-term catastrophe bond that is linked to the change in climate risk.

143 Tooth (2012, pp. 37–38) found over 20 per cent of survey respondents, who assessed themselves as relatively highly exposed to flood, did not understand the risk prior to choosing to live in their location.

Numerous empirical studies from Australia and international jurisdictions have found a relationship between property prices and information on hazard risk.[144] Key findings from this literature suggest that:

- property prices respond to changes in hazard information[145]
- insurance premiums convey information to consumers about risks[146] and the difference in property prices may closely reflect the difference in the capitalised value of insurance premiums[147]
- risk mitigation can have a significant positive impact on property prices[148]
- the significance of hazard-risk information on property prices may diminish over time.[149]

The ACCC (2018, p.178) noted the issue of risk disclosure at the time of property acquisition was raised explicitly in several submissions. The ACCC recommended that:[150]

> *States and territories should implement measures to prompt consumers to investigate insurance costs when they are considering purchasing real estate.*

We agree with this broad recommendation; however, we would also add that consumers should also be encouraged to obtain information that will help provide an indication of future insurance costs by:

- considering a range of insurance quotes (and noting the risk that higher quotes may be more reflective of future premiums)
- considering that insurance premiums may rise to reflect greater risks due to climate change particularly in high-risk areas.

To support the latter, governments should provide support for the provision of information on the impact of future hazard-risk.

Recommendation 4

Governments should encourage consumers to investigate current and future hazard risk and insurance costs prior to property investments.

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144 For example, Dobes et al. (2013) examined changes in property-sale prices following the 2011 Brisbane floods and the release of online flood zone information in 2008. They found property prices did drop significantly for properties at risk of 1-in-20 and 1-in-50 year floods with changes in perceived flood-risk. They also found that flooding did not significantly affect prices in areas that flood frequently and where flooding was rare (i.e. risk of 1-in-100 years). They surmised the lack of price change in the former reflected that buyers had already factored in the flood risk and the lack of noticeable price change flooding in the later because such events are too rare to be of concern from year to year.

145 Dobes et al. (2013); Bin & Polasky (2004); Yeo et al. (2015).

146 Nyce et al. (2015).

147 For example, Bin & Kruse (2006) in a study on property sales in North Carolina, US concluded that 'price differentials for flood risk and the capitalized value of flood insurance premiums are roughly equivalent'. See also Bin & Polasky (2004).

148 For example, Guignet et al. (2015) examined the economic impacts of adaptation structures. They found that homes located in the two-foot sea level rise zone see a large increase in property prices from some adaptation structures—up to a 21% increase in price—relative to homes in the 2-foot sea level rise zone without an adaptation structure.

149 Yeo et al. (2015, pp. 9–10).

150 ACCC (2018, Draft Recommendation 7).

4.2.3 Other information to make insurance purchase decisions

Consumers also need information to make insurance purchase decisions including the type and level of cover and the choice of insurer.

To reduce the risk of underinsurance, households (who do not purchase a total replacement cover policy) need to estimate their sum-insured. In recent years, the insurance industry has worked to provide greater guidance to consumers purchasing home building insurance on the potential cost of rebuilding in the event of a total loss (for example, a home is destroyed by a bushfire). However, the accuracy of insurer rebuilding estimates is inhibited by a lack of consolidated public information about the rebuilding standards applicable in each specific location and how this impacts the total rebuilding cost. Similarly, it would be helpful when purchasing a property, for investors to know if the property conforms to, or exceeds, the modern building code via a certification.[151]

Recommendation 5

Governments should consider consolidating, releasing and promoting the use of public information on building standards.

Consumers also need information to assess their policy options. The information pertaining to insurance policies are contained in product disclosure statements (PDS) that are easy to obtain. In our experience, PDSs (for household policies) are relatively clear but extremely difficult to compare. Numerous studies have shown that consumers are unlikely to read PDSs and there are continuing discussions as to how to make it easier for consumers to compare policies.[152]

Other research suggests that households predominantly worry about price and the insurer's reputation.[153] This may reflect that, with respect to the most significant risks (with exception of flood cover), policies of the major brands tend to be reasonably similar and that consumers find it easier to use the insurer's reputation as a signal of the quality of the cover they obtain and—in addition—the level of claims service they are likely to receive. A consumer may judge an insurer's reputation from a range of sources, including the experience of friends and family, online discussions, websites providing comparisons and brand advertising.

An indication of an insurer's service performance may also be derived from statistics on disputes. Such data is collected and compiled by AFCA (which replaced the Financial Ombudsman Service, FOS). This data includes the statistics on the frequency with which insurers are in dispute and dispute outcomes. The information is not ideal, as not all cases of high consumer dissatisfaction progress to dispute resolution. Nevertheless, given the importance of the insurer's reputation as a factor in consumer decision making and the limited extent to which PDSs are reviewed, it would seem appropriate that efforts be made to ensure that as much information as possible is released in a useable form and that

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151 An industry participant noted that 'Exceeding the standard is an important point, as the standard is currently the minimum required to preserve life, not to provide a cost-benefit for building resilience and hence insurance.'

152 For example, see research and discussion in ICA (2015b).

153 Tooth (2012, pp. viii–ix).

the use of the information is promoted. Feedback received also questioned whether other customer satisfactions measures might be developed and made available.

Recommendation 6

Consideration be given to the further use and promotion of insurance dispute-resolution information and, potentially, other measures of customer satisfaction to aid consumers in making insurance decisions.

Assessing policy options is more challenging for businesses whose needs tend to be more varied compared to households. In part, the decisions for small business are simplified through the development of industry tailored business insurance policies (e.g. for restaurants, gift shops etc). However, regardless of the type of business, some aspects such as the extent of business interruption cover can be difficult for the business to assess and advice from a broker or other service provider may be needed.

A common industry view is that the level of claims service, which reflects factors such as the insurer's responsiveness and process of resolving disputes, can vary greatly.[154] To support brokers who provide advice and consumers, LMI Group provide a claims comparison service, which rates the insurer claims service based on a range of factors including the AFCA dispute data, surveys of industry participants and other factors.[155]

[154] This is emphasised by LMI (https://www.claimscomparison.com/about-rating/why-we-rate

[155] See https://www.claimscomparison.com/ for the service and details of the rating process.

5. Climate change, premiums, and affordability

This section examines the impact of climate change and other factors on insurability and affordability of insurance cover into the future. It begins with a discussion of the current cost of insurance and then considers how this may change in the future due to climate change and other factors.

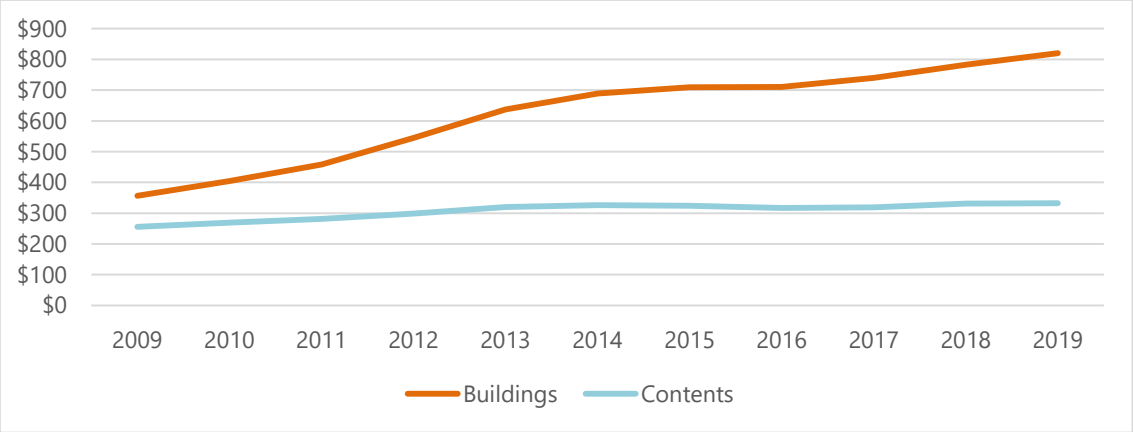
5.1 The cost of insurance

5.1.1 Household insurance premiums

The average annual premium in Australia for a combined home and contents insurance policy was around $1,300 in 2017–18.[156] While significant, the premium is relatively small compared to other household costs—the median annual mortgage repayments, reported in the 2016 Census was $21,060.[157]

Data on insurance premiums (sourced from Insurance Statistical Australia, ISA)[158] is shown in the figures below. As illustrated in Figure 8, the average (pre-tax) premium per policy for building cover premium has more than doubled over the last 10 years, increasing at a cumulative average growth rate of more than 8 per cent per annum. The average contents insurance premium has also grown but at a much slower rate.

Figure 8: Average premium per policy



Source: ISA. Note premiums are exclusive of taxes

This increase in premiums has been largely driven by an increase in the sum-insured per policy. As illustrated in Figure 9, the average cost per dollar of sum-insured has remained largely unchanged for contents cover between 2009 and 2019 and for building cover since 2014. We understand, the large

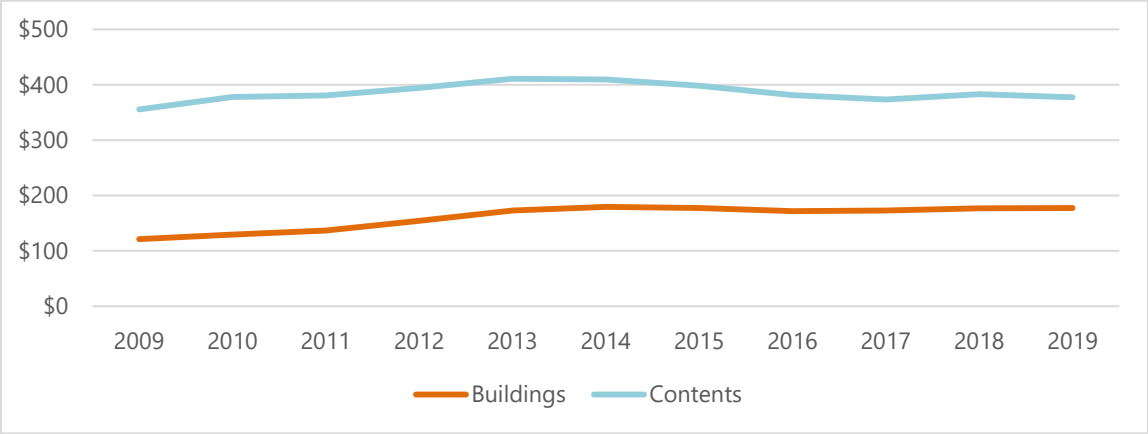
156 ACCC (2018, pp. 20).

157 Equivalent to $1,755 per month as reported in the 2016 Census.

158 ISA was established in 1998. It collates data supplied from most Australian insurers.

increase in the cost per sum-insured of building-cover between 2009 and 2014 (equivalent to 8 per cent per year) is largely attributable to the roll-out of flood cover over that period.[159]

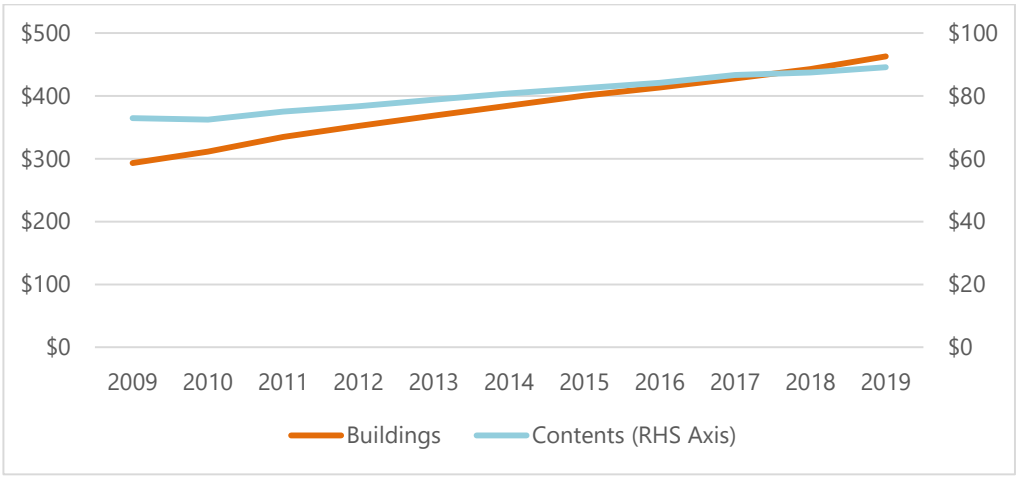
Figure 9: Average premium per $100k of sum insured



Source: ISA. Note premiums are exclusive of taxes.

The average sum-insured per policy (shown in Figure 10 below) has been increasing steadily at an annual rate of around 4.5 per cent for building cover and 2 per cent for contents cover. The increase in the building sum-insured may reflect changes in the size and quality of houses, changes in building codes and general inflation.[160]

Figure 10: Average sum-insured ($000s) per policy



Source: ISA. Note premiums are exclusive of taxes

The premiums paid by households can vary greatly, predominantly based on the property risk and policy coverage (including the sum-insured and the excess). The ACCC in its recent review found that the average premiums paid in the highest risk postcodes (all in Northern Australia) were 3 to 10 times the average for southern parts of Australia. On a sum-insured basis, the variation can be more

159 The timing of the introduction of flood cover varied by insurer (see ICA 2018b, pp. 12–13).

160 https://www.allianz.com.au/home-insurance/news/the-cost-of-building-a-house

extreme as the properties in the high-risk regions tend to be of lower value. There is also significant variation within postcodes.

In some cases, the quoted premiums appear extreme relative to the value of an asset, particularly where the house is subject to high flood and/or cyclone risk. For example, Andrews and Lau (2018) provide an example of a house in Ingham in Northern Queensland for which the average quoted insurance premium was around $4,700 (range from around $3,300 to over $6,000), equivalent to around 3.5 times the Average Weekly Household Disposable Incomes for the region. The value of the property (we estimate) is in the order of $150,000 and consequently the annual premium would be in the order of 2 to 4 per cent of the property value per year.

5.1.2 Business insurance premiums

Most businesses purchase packaged insurance policies that contain a range of coverages, including coverages for general property and business interruption that are relevant to this review and other non-disaster related coverages (e.g. public liability, theft, machinery breakdown).

The cost of the business cover varies significantly with the coverage options taken, the value and location of the property and the nature of the business. A recent survey of retail businesses found 80 per cent paid between $76 and $200 per month (average $96 per month).[161]

Table 15: Average annual premium for selected industry sectors

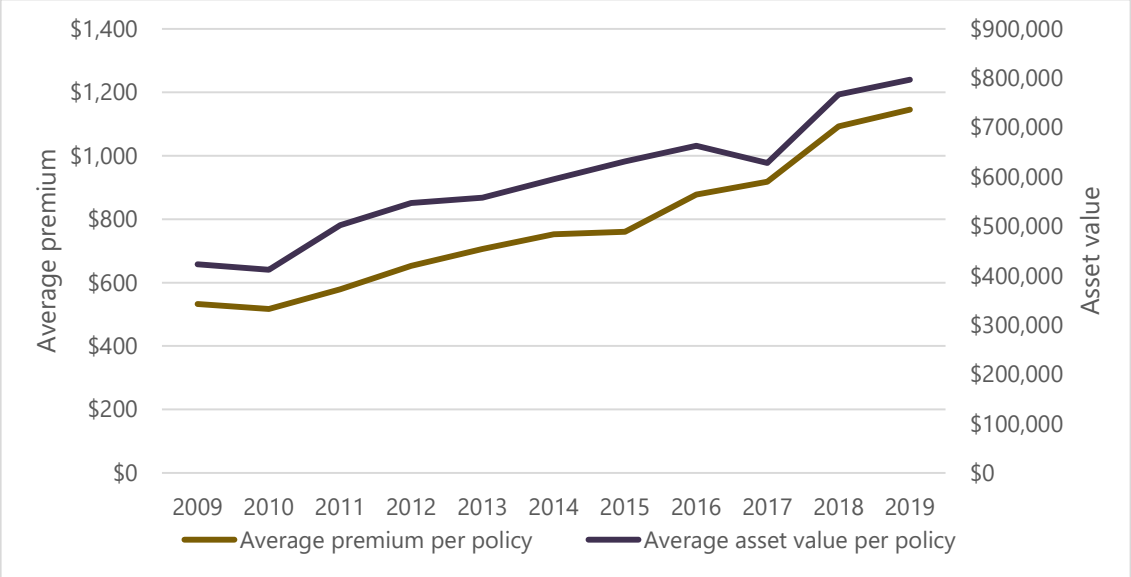
Industry sector	Business Interruption	Package
Agriculture, forestry and fishing	$1,921	$676
Mining	$458	$1,211
Accommodation, cafes and restaurants	$2,227	$1,145
Manufacturing	$1,225	$1,090
Construction	$848	$587
Wholesale trade	$1,313	$991
Retail trade	$734	$815
Transport and storage	$655	$871
Property and business services	$405	$597
Health and community services	$765	$597

Source: ISA. Data is exclusive of state taxes.

[161] https://www.bizcover.com.au/how-much-does-business-insurance-cost/

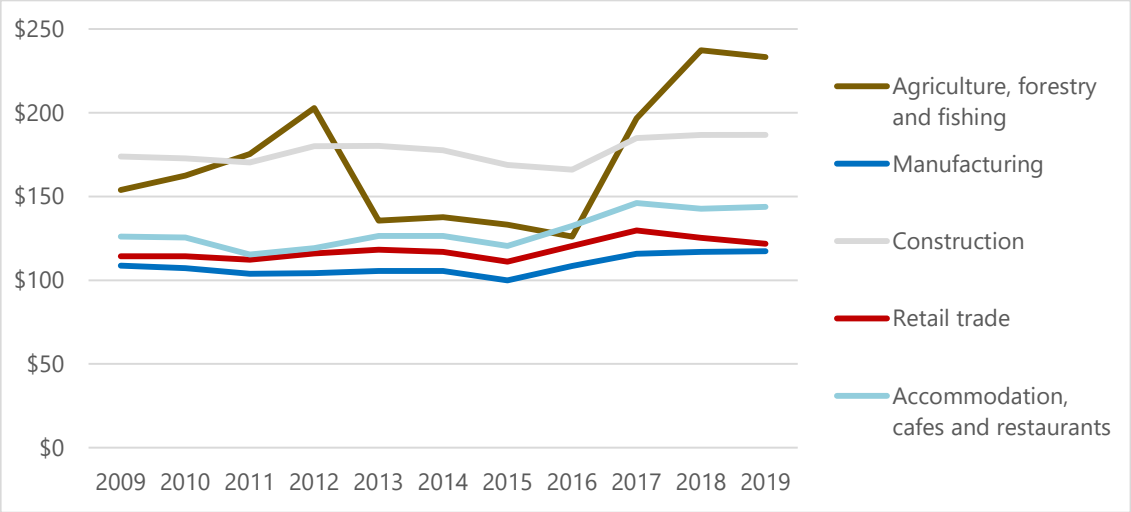
As with the residential policies, the cost of insurance has been rising steadily, largely in line with the value of assets being insured. This is illustrated in Figure 11 below for the retail trade industry and reflected in Figure 12, which shows average premiums per $100,000 of asset value for selected industries.

Figure 11: Average premium and average asset value—Retail Trade businesses



Source: ISA. Data is exclusive of state taxes.

Figure 12: Average of premium-per-$100k of asset value (selected industries)



Source: ISA. Data is exclusive of state taxes.

5.2 The impact of climate change

5.2.1 Overview

As discussed in Section 2.1.3, climate change is expected to affect the frequency and intensity of several natural disasters, including bushfires, floods, storm surge (in part due to rising sea levels) and cyclone risk.

Such changes have several potential implications for the cost of disaster insurance cover.[162] The most salient implication is that increases in the frequency and/or intensity of natural disasters will directly increase the expected losses incurred by insurers and consequently the premiums charged by insurers.

In addition, climate change could impact on insurance premiums by increasing the uncertainty associated with expected losses and estimates of the probable maximum loss (PML) that insurers are exposed to. These factors may contribute to higher premiums as a result of insurers purchasing more reinsurance and/or holding higher levels of capital in reserve.

While the above factors appear likely to impact on insurance premiums, they appear unlikely to materially affect the *insurability* of disaster events in Australia and New Zealand. Of note:

- changes in costs (reflected in the technical premium) should not impact insurability, as insurers can modify their prices over time in response to changes in expected loss
- re: catastrophic risk, the probable maximum loss (PML) in Australia and New Zealand is largely driven by earthquake risk (which is not affected by climate change). Regardless, the PML of an Australian or New Zealand catastrophe is small on an international scale and well within the capacity of international reinsurance markets.

Nevertheless, climate change may have implications for affordability, which may impact on demand for insurance. Changes in premiums could also be the catalyst for other changes in consumer behaviour and affordability concerns could lead to pressure on regulatory intervention. The issues of affordability are considered below.

5.2.2 Estimates of the impact of climate change on insurance premiums

There have been some attempts to quantify the future impacts of climate change on insurance premiums. A summary of some of the publicly available analysis is provided in Box 5 below.

[162] Climate change may also have implications for liability issues and liability insurance cover. See Kunreuther & Michel-Kerjan (2007).

Box 5: Forecasts of the impact of climate change on premiums

The **Commonwealth Bank,** in its Annual Report 2018 (as part of its TFCD reporting), presented analysis of the potential impact of increasing insurance costs on its lending portfolio. In summary the bank

- considered 'high risk' properties where insurance costs have the potential to create financial strain for customers and their property values
- estimated high risk properties make up only 0.01% of 2020 portfolio, but would increase—under high emissions (RCP 8.5) scenario—to around 1% in 2060, assuming no change in the portfolio, lending approach and no mitigating actions are taken
- estimated annual average losses to customers across its home lending portfolio would increase by 27% by 2060.

IAG's Climate-related disclosure 2019 provides an illustration of the potential worsening risk of tropical cyclones impacting South East Queensland which 'could double at 2°C warming by as early as 2035 and triple at 3°C warming by as early as 2050.'[163]

Property characteristics (In suburbs in South East Queensland)	Change in peril risk for a +2ºC scenario	Change in peril risk for a +3ºC scenario
Not in flood plain or storm surge zone	+33%	+83%
Within flood plain whereby flood risk is affected by sea level	+50%	+250%
Within flood plain and affected by storm surge and sea level rise	+100%	+317%

ClimateRisk (2014) in a report titled 'Buyer Beware' projected potential increases in risk due to climate change. The authors assumed that, over the period to 2050, an increase of:

- 20 to 100 per cent in the bushfire component of premiums
- zero to 100 per cent in the flooding component of premiums
- 22 to 100 per cent in cyclone risk
- doubling to a ten-fold increase in loss associated with erosion and saltwater inundation.

In October 2019 **ClimateRisk** released updated analysis (exclusively) to ABC News.[164] Key findings released as part of the ABC News report include:

- 370,000 properties already effectively "uninsurable", which the authors define as when an annual premium is priced at or above 1 per cent of the cost to replace the property
- 'The data reveals more than 445,000 addresses where insurance would potentially be unaffordable or unavailable within 30 years, rising to 718,000 by 2100'
- 'the building standards being used at the moment are inadequate' … 'well-constructed properties in some coastal zones could be viable for insurance.'

163 https://www.iag.com.au/climate-related-disclosure-2019.

164 ABC News (2019). The analysis updated the analysis reported in Steffen et al. (2019).

The analyses in Box 5 above suggest some potentially very significant impacts, with estimates of some premiums increasing by 100 per cent or more.

However, it is difficult to assess how much weight should be placed on these results. The results are subject to great uncertainty and much of the analysis appears indicative; making use of illustrative assumptions. Some of the analysis is presented without accompanying documentation and none of the analysis is accompanied by sensitivity testing that examines how the results would vary with different climate scenarios and assumptions.

The results presented also appear to focus on what could (or might) occur under the more extreme scenarios and assumptions. For example, each set of analysis uses the high (RCP 8.5) climate scenario and appears to assume heightened risk. Furthermore, the sets of analysis do not consider offsetting adaptation measures we might expect, including public mitigation measures (e.g. flood levees), private mitigation (e.g. raised structures), changes in building location and improvements in disaster response.

Recommendation 7

Companies releasing analysis on the impact of climate change should be encouraged to document assumptions and present sensitivity analysis.

5.3 Other factors affecting premiums

There are a number of other factors that are affecting premiums, particularly in high-risk locations.

5.3.1 Granularity of risk-based pricing

Insurers are becoming more sophisticated and granular in their pricing of risk. Over time, insurers (and their reinsurers) have moved from setting premium rates based on a broad measure of location (e.g. postcode)[165] to setting premiums based on individual property risks based on location and attributes of properties. Armed with improved hazard information, insurers are better able to distinguish between higher and lower risks and adjust their premiums accordingly. All else being equal, this leads to increases in premiums for high-risk properties and reductions in premiums for low-risk properties. An example is provided in Box 6 below.

[165] ICA (2018b, p. 9) states that 'In simple terms, two decades ago the price of cover for comparable properties would not vary greatly within a geographic area, for example a postcode.'

Box 6: Example of more sophisticated and granular pricing

The figures below (taken from the ACCC's Northern Australia Insurance Inquiry first interim report) are an example of the effect of an insurer introducing more sophisticated pricing. The figures show the one-year change (in 2014, $ nominal) in the renewing (Figure 13) and new (Figure 14) premiums for home insurance in north Queensland in response to more sophisticated cyclone modelling, whereby cyclone risk was assessed on more detailed data, and new rating factors were introduced.

The figures highlight two features:

- Sophisticated pricing results in premium decreases and increases; in the example, about half of renewals experienced decreases and half increases.
- Insurers manage the premium increases on renewal customers, by 'capping' the yearly premium increase thereby spreading the full premium increase over a number of years. The premiums for new business increased by about 20 per cent on average.

Figure 13: One-year change in renewing premiums for home insurance

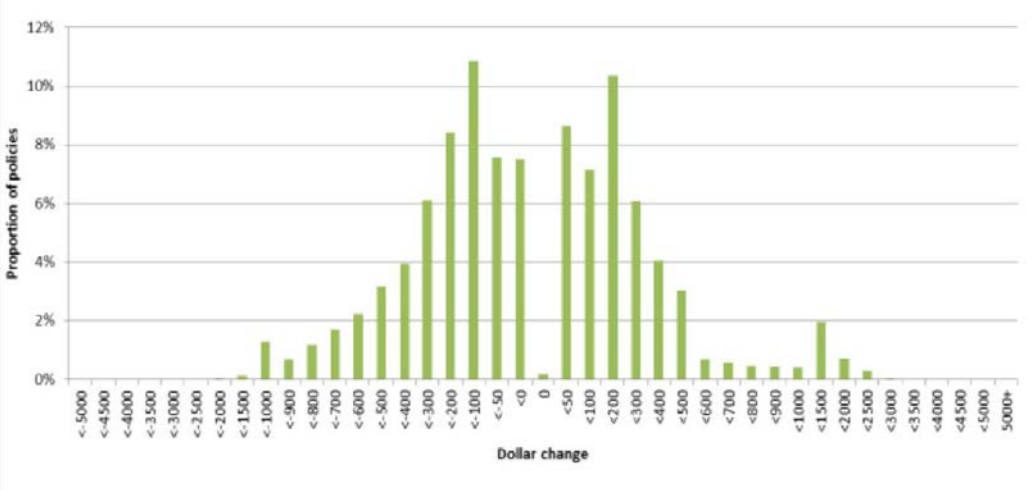
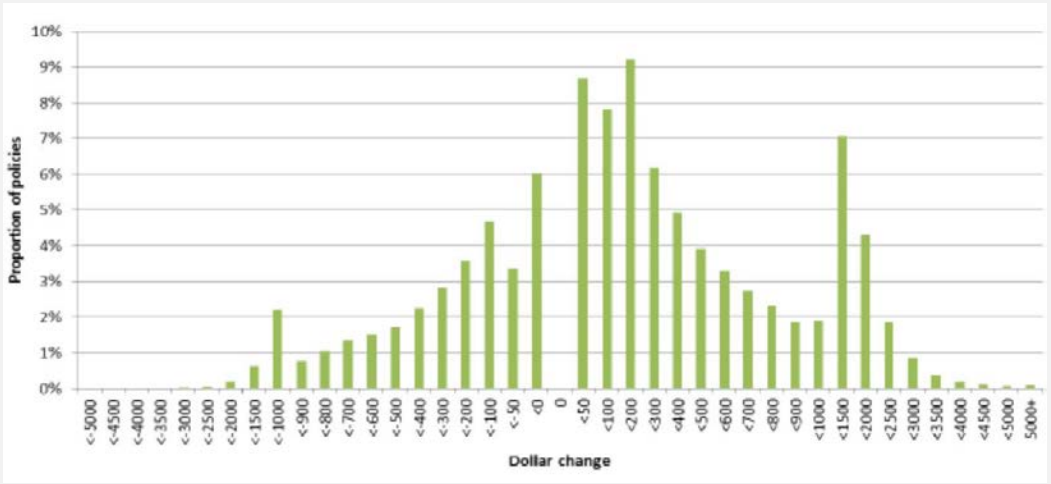


Figure 14: One-year change in new premiums for home insurance

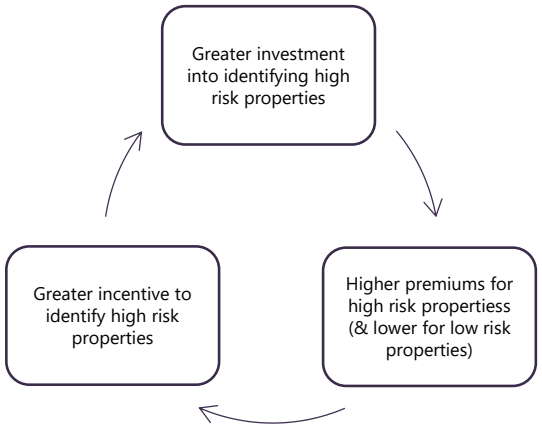


Source: ACCC (2018, pp. 70–71).

The shift to more granular risk-based pricing has important efficiency benefits, particularly by encouraging risk mitigation (including public mitigation efforts, private mitigation and smarter building choices),[166] and by providing a signal as to the cost of a risk. However, the shift to more granular pricing naturally results in higher premiums for consumers in high risk areas, which contribute to affordability concerns for property owners in these areas.

There may be further changes that occur as a result of greater granularity in pricing. We understand that in New Zealand, it is only recently that some insurers are pricing based on the individual address level risk (as opposed to on a postcode basis). In Australia, pricing is largely based on the individual address level risk, particularly for flood, but further refinements in pricing are possible. These may include, for example, further refinements in flood pricing (e.g. based on floor heights) and improved refinements to assess bushfire and flood risk via the use of more sophisticated modelling.[167]

Figure 15: Reinforcing cycle of granular pricing



The shift to more granular risk-based pricing is potentially a reinforcing cycle. More granular pricing leads to increasingly higher premiums for higher risk properties and relatively lower premiums for lower risk properties. This increases incentives for further segregation of high-risk properties. These factors incentivise greater investment in identifying and pricing risk.

In the future, further refinements to pricing could emerge in other disruptive ways. For example, improvements in disaster-risk forecasting coupled with increasing premiums for high-risk properties (e.g. for flood and cyclone risk) may lead to time-variant pricing and underwriting. Based on short-term climate forecasts, insurers could cease writing, or increase premiums for, new policies in areas where expected losses in the upcoming year have increased. A key barrier to such tactics is the reputational impact; however, insurers may be forced to examine such pricing in response to, for example, consumers using improved climate information to choose when to opt-in and opt-out of flood cover.[168]

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166 Another efficiency benefit is that it may induce greater use of insurance by lower-risk customers. This benefit may be more than the loss of take-up of insurance by higher-risk customers whose premiums have increased.

167 ICA (2018b, p. 16) provides an example of the premium differences that might occur for neighbouring properties due to different floor heights and building materials.

168 This appears to be a possibility. For example, consumers might assess flood risk using information on climate outlooks and dam levels. Most insurers currently have short (e.g. 72 hours) wait periods during which people are uninsured for flood and do not adjust pricing by season.

5.3.2 Rebuilding costs

Refinements to building codes aimed at mitigating hazard risk are having an impact on the expected rebuilding costs and consequently, the premiums in high risk areas. Building codes are largely designed to address safety issues and not reduce insurance costs, but despite this, the impact of replacement costs can be significant.

The impact of building codes on rebuild costs is illustrated with regards to bushfire risk. In Australia, properties are assigned a fire rating level—known as Bushfire Attack Level (BAL)[169]—that determines the construction code requirements. The code requirements are driving substantially higher rebuilding costs for properties which have higher ratings. For example, a 2015 paper for the Blue Mountains City Council reported residents paying an additional $60,000 when rebuilding in BAL-40 rated sites and $150,000 when rebuilding in BAL-FZ rate sites.[170] Building codes may also have a significant impact on rebuilding costs in flood zones and areas exposed to cyclone risk.[171]

Anecdotal evidence of insurance claims following recent bushfires suggests that the stringent building-code requirements have contributed to the issue of underinsurance, whereby some households did not appreciate the impact of the building codes on the rebuild costs.

Another implication of the higher rebuild costs is that there can be situations where the rebuild cost of a property can significantly exceed the property value. This is especially likely to be the case in high-risk areas where property prices are depressed as a result of high hazard risk (and subsequently, high insurance premiums).

In such cases, it may be efficient to relocate (i.e. retreat) rather than rebuild in the event of a total loss (or any loss that exceeds the property value). Such cases may coincide with government designs for managed relocations[172] or situations where there is a better (more resilient) use of land.

However, owners may be unable to obtain insurance cover that encourages retreat; whereby the sum-insured compensates the owner for the cost of relocation rather than rebuild. Insurers typically place minimum limits on the sum-insured, which can create issues in such situations. For example, we obtained quotes for a property located in Moree (NSW) that is being offered for sale for $120,000 where the minimum sum-insured (based on a few quotes) was in excess of $250,000.

In response to affordability concerns, IAG trialled a more affordable home insurance policy called InsureLite. Relative to standard policies, the product was less comprehensive in terms of coverage,[173]

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169 https://www.bushfireprone.com.au/what-is-a-bal/

170 Blue Mountains City Council (2015).

171 Furthermore, industry participants questioned whether the southward shift in tropical cyclone impact should lead to building codes being enhanced in some areas.

172 See for example, https://theconversation.com/moving-grantham-relocating-flood-prone-towns-is-nothing-new-4878

173 The InsureLite FAQ's stated: "InsureLite home building insurance only covers loss and damage to certain parts of your home buildings as described in the policy as your "Home". You are also only covered for loss or damage to your home caused by specified events. You are not covered for accidental damage to your home and may not be covered for damage caused by all events covered by other traditional home building insurance."

had maximum payable limits of $150,000 or $200,000 and facilitated a pay-out rather than a rebuild in the event of a total loss. The product was not popular, and the trial has been discontinued.

Recommendation 8

Investigation should be undertaken into insurance products that support retreat rather than rebuild in high-risk areas where retreat is desirable.

5.3.3 Risk mitigation

The cost of natural hazards and consequently premiums may be reduced by risk mitigation activities. Most stakeholders appear in agreement that risk mitigation (including public and private mitigation and development controls) is the only means to achieving significant and permanent reductions to insurance premiums.[174]

5.3.3.1 Publicly led risk mitigation

Publicly led risk mitigation activities include:

- public works such as the development of flood levees (see Box 7 below)
- land-use planning and building regulations
- other activities such as improving disaster preparedness.

The issues associated with risk mitigation are discussed in more detail in the ACCC Northern Inquiry report (ACCC 2018) and the PC (2014) review of Natural Disaster Funding Arrangements.

[174] This view was supported by non-industry stakeholders. ACCC (2018, p. 221) notes that 'In its 2015 report, the Northern Australian Insurance Premiums (NAIP) Taskforce found that mitigation to reduce the risk of damage from cyclones is the only way to reduce insurance premiums on a sustainable basis. The Australian Government accepted the finding of the NAIP Taskforce (and on this basis, indicated it would not intervene directly in the insurance market).'

Box 7: Government investment in risk mitigation infrastructure

The **Queensland township of Roma** (population ~7000) experienced frequent severe flooding between 2008 and 2012. Reflecting this risk, the price of flood cover was extremely high. This in turn stimulated the local and state government to invest in a $15 million levee system to protect the town from the most frequent flood events. The levee led to a significant fall in insurance premiums for the 483 home and 75 businesses protected by the levee. ICA (2018b, p. 15) reports that the average premiums reduction of around 34 per cent.

In **Launceston, Tasmania** the Launceston City flood levee has been constructed to protect areas of the city from flood. ICA (2018, p. 15) reports that median premiums in the levee protected areas are 20 per cent lower than in unprotected areas.

To protect flood-prone areas of **Western Sydney**, the NSW Government has proposed raising the Warragamba Dam wall by around 14 metres to create a flood mitigation zone. A key benefit recognised in the options assessment is a 75 per cent reduction in the expected damages (to homes, business and critical assets) caused by flooding, which are expected to lead to lower insurance premiums. (Infrastructure NSW, 2019, p. xiv)

5.3.3.2 Private risk mitigation

In response to increasing insurance premiums and affordability pressures, some households and businesses may be able to reduce their premiums by increasing mitigation and/or re-locating.

Property-specific mitigation can be effective in reducing risk. For example, the Queensland Government (Queensland Reconstruction Authority, QRA 2019) provides guidelines with information on improving the flood resilience of new and existing Queensland homes. The guidelines include a cost-benefit analysis (CBA) of retrofitting a home to be flood resilient (for two different common home types) and how this varied with flood risk. The analysis found that the benefits exceeded costs for 1-in-100 flood zones.

The guidelines note that a key benefit of the retrofitting investment is the insurance premium savings. Some insurers currently offer discounts for flood resilience measures (e.g. building elevation) and cyclone measures as part of the standard quotation process. Insurers may also provide additional discounts as a result of policyholders providing further evidence to insurers as to the mitigation they have undertaken.[175]

[175] The (QRA 2019) guidelines provide an example (p. 7) whereby following a flood, the owners renovated their home to increase their flood resilience. 'The house was raised approximately three metres above its original height to position the finished floor level above that of a 1% AEP (1 in 100) flood event. … Flood resilient design principles were incorporated into this lower level including rendered concrete block walls, a polished concrete floor, removable cabinetry and an internal layout that enabled easy cleaning post-flood. The value of this approach was recently recognised by their insurer, Suncorp, who gave the property significant premium relief. … following the renovations that incorporated flood resilient design strategies, Suncorp reduced the premium by ~40 per cent [from $5,253.33 to $3,133.60 per annum].

However, from a householder's perspective, the cost of risk mitigation may often exceed the benefits. Barriers include that (see also ACCC, 2018, pp. 222–223 and ICA, 2015b, p. 18):

- mitigation can involve a significant upfront cost, which they may be unwilling to accept; in effect, this can be characterised as consumers having a high discount rate
- they may be unaware of the extent to which mitigation is possible and can reduce costs
- the insurance premium discounts may be significantly less than the benefit of mitigation; reflecting that it can be costly and difficult for an insurer to verify that the appropriate level of mitigation has taken place.[176]

The barriers above may be reduced through targeted government mitigation assistance. Government assistance may be efficient because of economies of scale in marketing and coordination with the insurance industry (to facilitate premium reductions) and because governments are willing to accept a longer payback period (have a lower discount rate) than consumers. There is also an equity argument in providing assistance to homeowners who have experienced unforeseen large increases in premiums.

The Queensland Household Resilience Program is a good example.[177] The program provided funding to help low-income home owners improve the resilience of their homes (if built pre-1984) against cyclones. Successful applicants to the scheme received a grant of 75 per cent off the cost of improvements (up to a maximum of $11,250 including GST). The eligible improvements included roof replacements or upgrades, window protection and other improvements to reduce cyclone damage. We understand the program has been successful and has led to participating home-owners receiving reductions in insurance premiums (anecdotally <10 per cent).

Recommendation 9

Further investigation should be undertaken into targeted assistance/encouragement for private mitigation to reduce expected losses and premiums.

Some households and organisations may be able to reduce their hazard risk premiums by relocating. Relocation does not reduce the hazard-risk at a property site but can lead to the site being occupied by a user who is more resilient to the hazard risk and/or is better able to mitigate the risk. Relocation may be a reasonable option for businesses and households who are leasing a site; but the costs of relocating may be prohibitive for property owners. As noted above, it is desirable that consumers be able—and encouraged—to purchase insurance that facilitates relocating following a total loss.

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176 As noted by ICA (2015b, p. 18) of 'paramount importance' is 'a mechanism for insurers to become aware of the mitigation undertaken and to then offer discounts.'

177 https://www.qld.gov.au/housing/buying-owning-home/financial-help-concessions/household-resilience-program

5.4 Affordability and the risk of non-insurance

5.4.1 Considerations

The expected claims cost, and consequently premiums, can be very large for high risk properties; however, this does not necessarily reflect an issue with insurance affordability. The premiums set by insurers largely reflect the expected claims cost and thus higher premiums may largely reflect higher benefits. Furthermore, policyholders may choose to pay higher insurance premiums for some other benefit. For example, a consumer may rationally choose a property with higher flood risk and insurance premiums to save money on the cost of the property (and consequently mortgage repayments) or because the location is more attractive.

Consistent with this perspective, the empirical research (see section 4.2.1) finds that—controlling for other factors—income and wealth are not significant drivers of insurance demand. Where home buyers are making informed choices, the issue of insurance affordability may be more appropriately described as an issue of housing affordability, or more broadly an issue related to the cost of living.

Nevertheless, high premiums and concerns over insurance affordability may reflect some underlying issues.

First, insurance premiums may not reflect value for consumers due to a range of issues including:

- Government assistance for the uninsured reduces the benefits of being insured (see discussion of 'charity hazard' in Section 2.3.1)
- Insurance taxes[178] and other factors (e.g. regulatory burden) that lead to higher costs
- Information issues for insurers which lead to premiums being mispriced (see section 4.1).

Second, affordability may be an issue because asset owners face unexpected budget constraints. This may be because:

- they did not consider the cost of insurance prior to purchasing a property. This may in part be due to a lack of available information. The evidence as to the extent of consideration of risk is mixed (see section 4.2.2)
- the cost of insurance for their property has increased unexpectedly. As discussed above, this is particularly an issue for high-risk properties where premiums may have increased (beyond what might have been reasonably expected) due to increased granularity of risk-based pricing, changes to building codes and a changing climate
- other (than insurance) factors that affected their budget. For example, a loss of income may cause asset owners to reduce insurance cover as a way of managing their budget.

For asset owners faced with severe budget constraints, reducing expenditure on insurance may appear the most practical means of managing the budget due to the difficultly of reducing other expenditures. For example, many significant household costs such as the mortgage repayments and rates are fixed expenditures that the home owner has little control over.

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178 See discussion is Section 2.2.3.3.

5.4.2 Estimating the impact of price changes on demand

There have been several empirical studies that have attempted to examine how demand varies with price of insurance. Most studies have found that the decision to purchase building insurance is not very sensitive to price.[179] However, the relevance of most studies appears limited as they do not disentangle the impact of why prices may vary;[180] most significantly, the issue that higher premiums can reflect higher expected claims costs, which are a consumer benefit.

To understand the impact of changing premiums it is useful to consider the reasons why premiums may vary and may change over time. These include variations/changes in:

1. **the premium loading (i.e. non-technical costs of insurance)**—That is, premiums change for reasons that are not related to customer benefit (e.g. a change in taxes or increases in capital reserving costs)
2. **the risk and expected-loss**—For example, a change in building codes leads to higher rebuilding costs, climate change leads to an increase in risk, mitigation leads to a reduction in risk
3. **the accuracy of risk-based pricing**—For example, improved flood-mapping leads to an increased premium for higher risk properties and a reduction in premiums for lower risk properties; much of the increase in premiums in far-north Queensland have been attributed to historic under-pricing in that region.

The impact of a change in the **premium loading** is clear. An increase in premiums for this reason provides no benefit to consumers and will clearly reduce insurance demand. Analysis based on variation in state taxes provides evidence as to the size of the effect for demand for building and contents insurance. In summary, a 1 per cent increase in premiums for this reason is estimated to induce (over a period of a few years) a:[181]

- 0.06 per cent reduction in the take-up of building insurance
- 0.19 per cent reduction in the take-up of contents insurance
- 1.3 per cent reduction in expenditure on insurance.[182]

The impact of the other changes is less clear.

An increase in the premium due to **an increase in risk** may lead to some consumers increasing or decreasing their cover. This is reflected in responses to a household survey shown in Figure 16 below.

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179 Most reporting price elasticities of demand smaller than -0.15. The price elasticity of demand refers to the expected percentage change in demand associated with a percentage change in price. A summary of much of the US literature can be found in NASEM (2015, pp. 52–56).

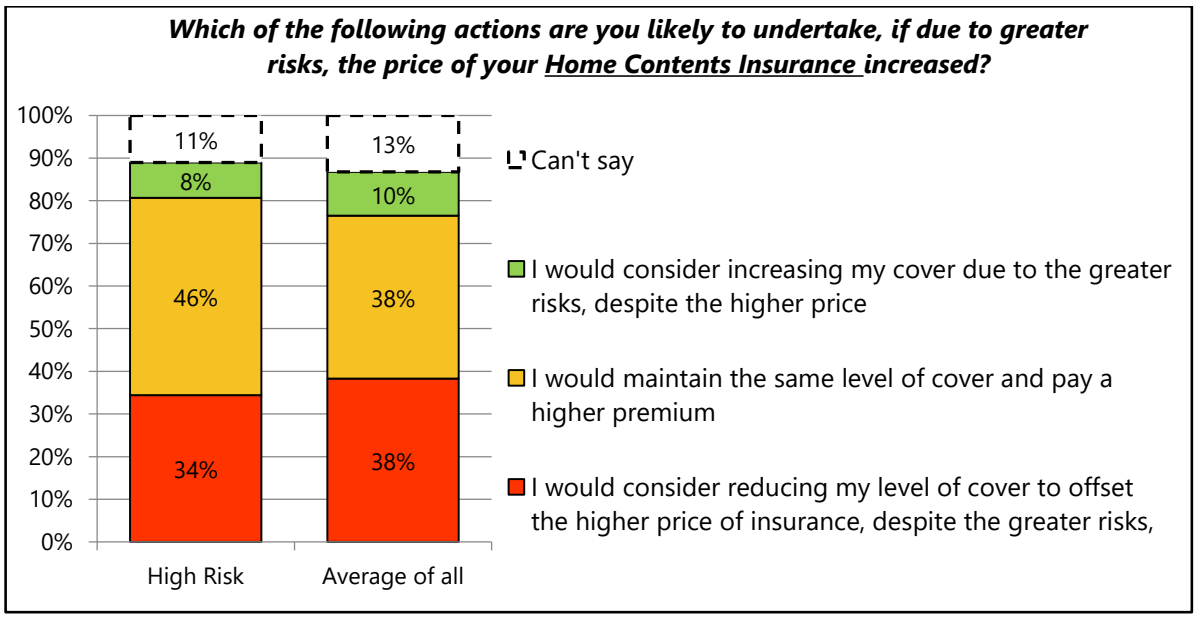
180 The relevance of most international studies appears limited due to a range of issues including the problem of price and the regulated environments. For example, several studies examine how demand for US flood insurance varies with average premiums. In the US premiums are regulated but partly risk-rated and consequently, a relationship between demand and premiums may reflect other factors that are correlated with the risk-rating used to set premiums and deviations between the risk and the technical price.

181 See Tooth (2015). These estimates are comparable to that found in other studies (e.g. Dixon et al. 2006).

182 The reduction related to expenditure on insurance reflects the reduction in take-up and the reduction obtained by consumers for less expensive policy options (including choosing larger excesses and lower sum-insured).

When asked what they would do in response to higher premiums *due* to higher risks a sizeable proportion of respondents indicated they would consider reducing their cover; however, a large portion of respondents indicated they would not change their cover and a significant group indicated they would consider increasing their contents insurance cover. Of note, the same household survey found evidence that non-insurance rates were no higher in high-risk areas.[183]

Figure 16: Responses to changes in premiums to changes in risk



Source: Tooth (2012). 'High Risk' refers to respondents with higher hazard risk. 'Average of all' refers to the full sample

Increased **accuracy in risk-based pricing** could lead to increases or decreases in insurance cover.

It could lead to greater insurance coverage as a result of reduced premiums for low risk customers. For example, in the absence of accurate risk-based pricing for flood, low-risk customers (e.g. with elevated properties) may choose to opt-out of flood insurance as the cover does not reflect value. A shift to risk-based pricing would increase premiums for high-risks; however, if premiums are priced close to their technical price, the insurance cover for these high-risks will still be valuable for risk-averse customers.

Refinements to risk-based pricing may also lead to reductions in insurance demand. In the case of Northern Queensland, the predominant changes have been premium increases to account for higher future expected losses. For some owners, these increases have been significant and unexpectedly high compared to their previous premiums, which combined with other budget pressures, may result in an overall reduction in the level of coverage demanded.

Predicting how consumers might respond to higher prices is challenging. The estimates of responsiveness to price are based on small variations in premiums and may not be representative of the impact when very high premiums lead to significant budget pressures. Large increases in premiums may prompt very different behaviours to those measured in empirical studies. A large

[183] Tooth (2012, p. 28) found that non-insurance rates for flood were similar in high-risk and normal-risk areas.

increase in premium may be a catalyst for adverse selection/morale hazard whereby the increase prompts consumers to investigate alternative strategies when pricing is not truly cost-reflective. For example, it may lead to consumers:

- (as noted earlier) timing their purchase of insurance by only purchasing flood insurance when the expected flood risk is higher
- opting out of insurance and instead investing in significant mitigation activities (e.g. wet-proofing) that are not rewarded in premium discounts[184]

Such consumer responses may have significant implications for the insurance industry. If consumers begin timing their purchase of cover, insurers will need to modify their pricing practices. Wide spread opting out of insurance may lead to increased political pressure for regulation. The risk of adverse-selection/moral-hazard could potentially be reduced with further improvements in risk-based pricing (e.g. to ensure mitigation is appropriately rewarded) and policy offerings (e.g. longer-term contracts).

Further research into the effect of pricing changes would help in assessing how premium changes, including increases in risk and greater granularity of risk-based pricing, are affecting demand. In Australia, this might potentially be undertaken by the ICA using data collected through its Policy-In-Force (PIF) exercise which is being conducted every two years.[185]

Recommendation 10

The insurance industry should conduct further research into how demand responds to changing risk and premiums in high risk areas.

5.4.3 Defining and measuring affordability

A definition, and measures, of insurance affordability are potentially of interest:

- to form the basis of policy. For example, in the United States, FEMA investigated affordability measures in designing a targeted assistance policy (see Box 8 below). For this purpose, a definition is required that can be applied at a household level.
- to help forecast the impact of rising premiums; that is, to help forecast when consumers will opt-out of insurance and/or when tensions may arise due to affordability pressures.

Our focus in this report is on the second definition.

Defining affordability is challenging. A recent review of affordability of flood insurance premiums in the United States,[186] concluded that there is no objective definition of affordability—rather that the concept is subjective and there are multiple ways to measure the cost burden of insurance.

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184 In effect this is an example of moral hazard, whereby the asset-owner takes additional precautions that they do not take once insured.

185 The PIF dataset records a snapshot of any building related policy that is in force at address level across Australia. See https://www.icadataglobe.com/pif-2019

186 NASEM (2016, p. 101).

In recent analysis, ClimateRisk (see Box 5 on page 59), suggests insurance is unaffordable[187] if the annual premium is in excess of 1 per cent of the cost to replace the property (i.e. the sum-insured). However, we believe a definition of 'affordability' should be more nuanced and importantly should reflect—as discussed in the previous sections—that higher premiums are associated with higher benefits and that consumers may trade-off paying higher premiums for a property for other benefits (including a lower purchase price).

Our interpretation is that something is 'affordable' if potential buyers have budget to purchase it and it is priced reasonably; which primarily depends on whether it provides value-for-money (while meeting the costs of supply) and is consistent with expectations. Accordingly, we consider affordability with respect to the extent to which:

- asset owners have the ability (i.e. the financial resources) to pay for insurance
- insurance provides value for money
- premium rises are expected or reasonably foreseen.

Box 8: The affordability framework for the US National Flood Insurance Program (NFIP)

In 2012, the US Congress sought to reform the NFIP by making insurance rates more risk-reflective. Concerns about rising premiums from constituents led Congress to pass the legislation[188] requiring FEMA to develop an affordability framework aimed at providing targeted assistance for policyholders.

In developing a flood insurance affordability framework, FEMA considered three different affordability concepts, whereby flood insurance is considered unaffordable:

- *based strictly on household income*. Using such a definition assistance would be means-tested (i.e. applied if household income was below a threshold)
- *when the cost of insurance exceeds a specified percentage of household income*. e.g. when the household needs to spend more than 1 per cent of its income on flood insurance
- *if the housing burden (including flood insurance) is more than a specified percentage of income.* The housing burden for homeowners consists of mortgage principal and interest (PI), property taxes (T), and insurance (including flood insurance—I), or PITI. For renters it is defined as the ratio of rent plus insurance (typically contents insurance) to household income. FEMA would consider flood insurance unaffordable if flood insurance causes the ratio of PITI to income to exceed 0.30 to 0.40.

Source: Homeland Security 2008. See also National Academies of Sciences, Engineering, and Medicine (2016). National Research Council (2015).

187 ClimateRisk used the term 'uninsurable'.

188 Homeowner Flood Insurance Affordability Act of 2014 (HFIAA).

5.4.3.1 Ability to pay

A measure of affordability needs to reflect the ability of the policyholder to pay the premium. Some households can afford, and may currently pay, premiums in excess of $15,000 per year;[189] others may only have budget for much more minimal coverage. As such, consideration must be given as to how to define affordability across different types of households.

In the United States FEMA (see Box 8) considered two relevant measures: the cost of insurance as a percentage of household income; and the housing burden (which incorporates insurance and other housing costs) as a percentage of household income.

In the Australian context, Andrews and Lau (2018) developed an affordability measure based on the estimated premium, and measures of the average household income and socio-economic status of the local area. The measure (described in Box 9 below) is based on estimated (but calibrated) insurance premiums by property and applied to a local area (i.e. not an individual household). Using this measure, the authors estimated that affordability would be challenging for around 4 per cent of the population. They concluded that flood and cyclone were the two perils most significantly affecting affordability and that, by number of properties, most of the unaffordable premiums were in NSW and Queensland.

Box 9: Insurance affordability measure

Andrews and Lau (2018) proposed measuring affordability based on the weeks of Average Weekly Household Disposable Income (AWHDI) in the local area[190] needed to pay for home insurance.

They also considered that affordability varies by socio-economic group as measured by a SEIFA (Socio-Economic Indexes for Areas) index.[191] They assumed the cost of insurance was unaffordable if the annual premium was greater than the following cost thresholds:

- > 1.5 weeks of AWHDI for households in the bottom SEIFA quintile
- > 2 weeks of AWHDI for households in the 2nd bottom SEIFA quintile
- > 3 weeks of AWHDI for households in the middle SEIFA quintile

The approach of measuring costs in terms of weeks of disposable income coupled with a measure of local socio-economic status appears a reasonable method—given the data limitations—of measuring ability to pay in a region. Unfortunately, the effectiveness of the measure cannot be tested given the lack of insurance data available at a local level. A weakness of the measure is that it does not account for a range of important factors including household wealth, the burden of other housing costs (notably the mortgage) and tenure (i.e. whether properties and owned or rented).

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189 ICA (2018b).

190 Household disposable income refers to all income (including interest and transfers) less taxes on income.

191 SEIFA refers to a set of indexes developed by the ABS that ranks areas in Australia according to relative socio-economic advantage and disadvantage. The indexes are based on information from the five-yearly Census of Population and Housing, including information indicators of financial stress such as whether the respondent was "Unable to raise $2000 in a week for something important".

The approach adopted by the Commonwealth Bank (see Box 5 on page 59) of estimating financial stress based on household characteristics would appear likely to produce more accurate results; however, such an approach is dependent on household information that is held by financial institutions.

Another approach would be to develop a measure in terms of the impact on total housing costs. To measure housing affordability stress, the Australian Housing and Urban Research Institute (AHURI) applies a '30:40' indicator which identifies housing affordability stress when the household has an income level in the bottom 40 per cent of Australia's income distribution and is paying more than 30 per cent of its income in housing costs.[192]

5.4.3.2 Perceived value for money

The perceived value-for-money of the insurance premium will also be a factor influencing whether a financially constrained asset owner will decide a premium is affordable.[193] Conversely, an asset owner may choose not to insure because they perceive the premiums to be poor value-for-money.[194] This may be because the owner believes their property is inherently less risky than reflected in insurance premiums,[195] or that they can more cheaply mitigate the risk[196] or because of other factors adding to the cost of insurance.

When premiums are low, the issue of mispricing of specific risks may be small.[197] However, mispricing may become a greater issue for higher premiums and particularly (as in the case of flood) where the asset owner can easily opt out of cover. Higher premiums—as a result of climate change and/or further granularity of pricing—may provide the catalyst for high-risk customers to evaluate their risks and options and opt out of cover.

The mispricing of risk may be reduced through improved information and increased granularity of pricing. More granular (i.e. accurate) pricing will lead to a reduction in the number of properties whose owners perceive the insurance premium as poor value.[198] Furthermore, with better information, insurers will be able to more accurately price and encourage private mitigation.

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192 AHURI definition of housing costs include 'rent, mortgage payments (including both the principal and interest), rates, taxes, household insurance, repairs and maintenance, as well as interest payments on loans for alterations and levies on strata-titled dwellings.'

193 We received anecdotal evidence in support of this.

194 When insurance is priced close to its technical premium, we expect (due to risk aversion) most people will perceive the premium to be value-for-money. Furthermore, due to lending requirements, homeowners may feel obligated to purchase insurance.

195 This relates to the issue of adverse selection.

196 This relates to the issue of moral hazard. The issue exists to the extent that the insurer cannot reward the policyholder with a lower premium for the mitigation.

197 For example, many asset owners may be confident that their property has a lower theft risk than reflected in the premium. However, the asset owner may still purchase cover because it is bundled with other coverage and/or because the premium saved is small compared to the loss of 'peace of mind' and the investment of asset-owner in investigating the risk.

198 For example, with better information, insurers will quote lower premiums for properties that are more elevated.

The issue of mispricing appears most likely to be an issue for flood risk, for which cover is optional and consumers may have more refined exposure information. Consequently, a useful indicator of issues with perceived value for money will be the proportion of properties that opt-out of flood cover.

Premiums may not be perceived as value for money for other reasons. For example, a household may find the minimum sum-insured excessive given their needs and preferences.

5.4.3.3 Extent of premium change

Another consideration in assessing affordability is the size and foreseeability of the premium increase experienced by a customer. All else being equal, we expect that policyholders that experience large premium increases are less likely to have budgeted for the premium and consider the premiums reasonable and, consequently, be more likely to consider the premiums as unaffordable, become uninsured and/or be vocal in seeking regulatory intervention.[199]

The size and foreseeability of premium change may also be a relevant consideration in any targeted assistance programs.

5.4.3.4 Summary

The 'affordability' of an insurance premium is of interest to the extent that it can be used to predict levels of non-insurance, which may in turn be used to guide interventions. For this purpose, affordability cannot simply be measured as cost per sum-insured. In our opinion the 'affordability' of insurance depends on whether potential policyholders have the ability (i.e. budget) to pay for insurance and whether premium are 'reasonable'. We assume a premium is reasonable if it represents value-for-money (i.e. the extent to which it is accurately priced) and that it has not increased excessively.

As 'affordability' depends on a variety of factors, it is difficult to develop a simple, easily applied measure. The affordability definition by Andrews and Lau (2018) (see Box 9 on page 72) appears to be a reasonably practical measure that can be implemented without access to personal household information (including that on other housing costs). This measure might be enhanced by also adjusting for variation in estimated housing costs (predominantly the mortgage), which may be lower in high risk areas.

The extent to which insurance presents value for money will primarily depend on the accuracy of risk-based pricing and the other factors (notably taxes) that impact on the insurance premium.

Ultimately the best indicator of affordability will be the extent to which consumers purchase insurance. For this purpose, it would be useful to collect and track further information on the take-up rate in high-risk areas. Measuring non-insurance is generally difficult. However, non-insurance with regards

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[199] Consider for example, two owners (A and B) living in identical houses and paying the same insurance premium but differing in A purchased the house before premiums rose substantially and B purchasing the house after the premium rise. We would expect that owner B will have more likely purchased the property at a discounted price and have budgeted for the insurance premium and consequently found the premium reasonable and affordable.

to flood risk might be reasonable easily estimated using counts of policies where the household has opted out of flood cover in high-risk areas.

Currently there is limited information that can be used to monitor affordability issues. The industry (through ISA) collates information on average premiums but not on the distribution of the premiums; that is, information that captures how premiums change for high risk locations (where premium rises are likely to be most significant).[200] Given the potential affordability issues, particularly from further refinements in risk-based pricing and climate change, the industry should consider monitoring information on the premium distribution and/or how premiums are changing designated high risk areas.

Recommendation 11

The insurance industry should monitor changes in the distribution of insurance premiums and insurance demand with a focus on high-risk areas.

[200] Independent actuarial modelling (e.g. Andrews 2018) provides estimates of disaster risks; however, this is based on estimated rather than actual data.

6. Encouraging the up-take of insurance

6.1 Current communication activities

A range of government bodies and other organisations have undertaken campaigns and developed material to improve the understanding of risk and insurance and to promote the take-up of insurance.

Government led campaigns include:

- campaigns focussed on the promotion of insurance. For example, the Victorian Government ran an 'Insure it, it's worth it' campaign (see Box 10) aimed at families. The Tasmanian Government is also looking to undertake a campaign to increase insurance take-up
- broader campaigns aimed at encouraging resilience, of which insurance is one component, for example, Get Ready Queensland (see Box 10).

Box 10: Example campaigns

"Insure it. It's worth it." (Victoria)

In 2017, the Victorian government (through EMV Victoria) launched a campaign called "Insure it. It's worth it." campaign to educate families about the risks of under or non-insurance, encouraging them to consider taking out insurance to cover their home and contents. The campaign included a website, video[201] and, with the support of Good Shepherd Microfinance[202] included a toolkit. The campaign had a limited budget but included use of printed materials, social media, radio interviews with the support of Scott Pape (a radio personality and author of the 'Barefoot investor').

Get Ready Queensland[203]

The Queensland Government established the Get Ready Queensland (GRQ) grants program to position Queensland as the most disaster resilient state in Australia. The program is an all-hazards, resilience building initiative incorporated under a single, overarching brand.

The aim of the 2019–20 GRQ program is to assist local governments in engaging their communities to help them better prepare for the storm season and build resilience against future disaster events.

In 2019–20, $2 million in grants have been committed to Queensland local governments to facilitate locally driven events and initiatives that cultivate individual and community participation and understanding of disaster preparedness and resilience.

201 https://www.youtube.com/watch?v=GQmqRu2fOj0

202 Good Shepherd Microfinance is an NGO whose purpose is "To enable economic wellbeing for people on low incomes, especially women and girls."

203 https://www.qra.qld.gov.au/funding/get-ready-queensland-councils

Numerous bodies provide advice and encouragement for those looking to buy insurance. These include:

- industry bodies—The ICA runs an "Understand Insurance" website, which contains information, tools and calculators to assist insurance consumers
- suppliers, including insurers and brokers provide guidance information
- other bodies providing advice / guidance on financial matters. These include:
  - ASIC, which runs the MoneySmart website that provides guidance information on a range of financial services including insurance[204]
  - advisors to small business (including small business advisory services)[205]
  - personal financial advisors
- other organisations such as Choice and comparator websites (e.g. Compare the Market).

6.2 Communication strategy

Building on the findings in this report, several ways were identified in which communications may be used to increase and sustain insurance levels/coverage. These have been incorporated into suite of potential objectives summarised in the table below.

Table 16: Potential communication strategy objectives

Objectives	Rationale / comment
1. Increase awareness of risks and cost of insurance, prior to investments in high risk areas	• To reduce the likelihood of premium shock and unaffordable premiums
2. Encourage greater uptake by households: • of flood cover in flood risk areas • of cover more generally in high risk areas	• Important group from the perspective of disaster assistance • Relatively easy group to target
3. Increase awareness and trust in insurance among households and small businesses	• Address issues of underinsurance in the business sector
4. Increase trust in, and understanding and awareness of the value of, insurance among general population	• Broad communication has potential to influence large population • Lack of trust is seen as barrier to insurance take-up • People are influenced by decisions of others

These communication objectives were explored in a workshop held with MaRS in November 2019. Ongoing work is being undertaken to explore and develop the potential communication strategies.

[204] https://www.moneysmart.gov.au/insurance/home-insurance

[205] https://business.sa.gov.au/protect-your-business/emergencies-and-natural-disasters

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