Financial Impact of Proposed Cyclone Schemes

Northern Australia Insurance Premiums Taskforce

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Actuarial and Insurance Consultants

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Department of the Treasury

Dear Sir/Madam

Financial Impact of Proposed Cyclone Schemes

We are pleased to present this report to assist the Taskforce to assess the feasibility of setting up a direct insurer or reinsurer of cyclone damage claims costs.

Please do not hesitate to call us if you have any questions regarding this report.

Yours sincerely

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Financial Impact of Proposed Cyclone Schemes

Part I Executive Summary

The Northern Australia Insurance Premiums Taskforce (the Taskforce) is assessing the feasibility of the Federal Government establishing a direct insurer or a reinsurer of cyclone damage. The purpose of the scheme would be to reduce Home, Contents and Strata premiums in Northern Australia.

The Taskforce has asked Finity to assess the financial impact of certain proposed schemes, including the likely capital requirements, the costs to the Government and the likely reduction in consumer premiums that could be achieved. The nature of the schemes proposed is summarised in Section 2 of the main body of the report. The key features of the four alternative structures are:

Figure 1 – Alternative Scheme Designs Considered

1. Unfunded	• No premiums collected, no capital, no reinsurance, claims funded by government guarantee.
2. Partially Funded	• Premiums cover expected claims costs and expenses, no reinsurance or capital. Government funds shortfall between reserves and actual costs.
3. 30% Discount	• Cyclone premiums set at 30% below current levels. May purchase reinsurance. Government funds shortfall between reserves and actual costs.
4. Full Funding	• Charges "commercial" premiums, fully capitalised, buys reinsurance.

In the remainder of this executive summary we show our estimate of the current premium pool for the cyclone peril and how that compares to long run expected claims costs, and we set out our assessment of the financial impact of some of the proposed direct insurer and reinsurer schemes. The results for all schemes are set out in the main body of the report.

1 Key Findings

The key findings from our review in respect of Northern Australia are as follows (corresponding results for the whole of Australia are shown in the full report):

1. For Northern Australia, the estimated premiums paid by consumers for cyclone cover[1] are $0.48 billion for Home, Contents and Strata insurance combined. These premiums vary materially for different groups of customers according to location, the characteristics of the insured's building and the length of the insured's tenure with their insurer. For many Home policies the cyclone premium is less than $500, whereas some pay more than $3,000 per annum.

2. The premiums compare with the following two measures of cyclone claims costs:

[1] Insurers do not explicitly split their premium into a component for cyclone and a component for other perils. Where we refer to the "cyclone" premium in this report, we are referring to our estimate of this component of the overall premium.

(a) the historical cost averaged over the last 20 years is estimated to have been $0.12 billion (in current values)

(b) catastrophe models suggest a long term average annual cost of $0.29 billion

It is almost certain that the long term cost is higher than the 20 year historical average because of the mix of cyclones actually experienced in the last 20 years, although it is unclear whether the long term cost is as high as the models would indicate. We have adopted the cyclone claim cost estimated by the models, noting that they are the best scientific estimates currently available, and also that they have some acceptance within the insurance and reinsurance markets.

3. When assessed against the modelled costs the current premiums appear to be of the right order of magnitude relative to risk. Whilst this statement may hold on average across Northern Australia, it would not hold for every customer in every region. This reflects the inherent uncertainties in pricing for risk of this nature where there is a heavy reliance on models. This dimension to the issue is important as it means that where we comment on reductions in premium, those reductions would emerge on average but not necessarily for every consumer.

4. A commercial entity providing cyclone cover to the whole market on a Fully Funded basis would not deliver any material saving to consumers. Potentially it would lead to higher premiums for some policies, noting that some customers would be paying less than the fully funded cost at the current time.

5. Accordingly, in order to provide lower premiums for consumers the government would need to either put its balance sheet at risk or provide a direct annual subsidy, or both. 'Putting the balance sheet at risk' is another way of saying that in good years the cost to government would be small, while in bad years it could be very large.

6. Scheme design 2 (Partially Funded) would require consumers to pay only the expected long run cost of cyclone claims in addition to the normal premium for other perils. We estimate that this model would result in a 24% average reduction in cyclone premiums for Northern Australia (11% reduction in total premiums).

7. Scheme design 3 (30% Discount) was specified by the Taskforce as a scheme that would achieve an average 30% saving in total consumer premium for residents of Northern Australia. This scheme would require a 62% reduction in the cyclone premium, with no change to the premium for all other perils. Residents in high risk areas would see a premium reduction of over 30%, while those in low risk areas a smaller reduction.

8. A First Loss scheme, which covers cyclone damage up to a fixed amount (say $30,000) for each property with insurers covering the rest, would have less risk for government, as it caps the government's liability on individual properties, but would probably not deliver sufficient premium savings to make it worthwhile.

9. The reduction in consumer premiums and the cost to government would be reasonably similar whether the scheme is provided by a government funded insurer or a reinsurance pool.

All the estimates in this report are subject to uncertainty. Key uncertainties are described in part 6 of this summary.

2 Current Cyclone Premiums

Our Approach

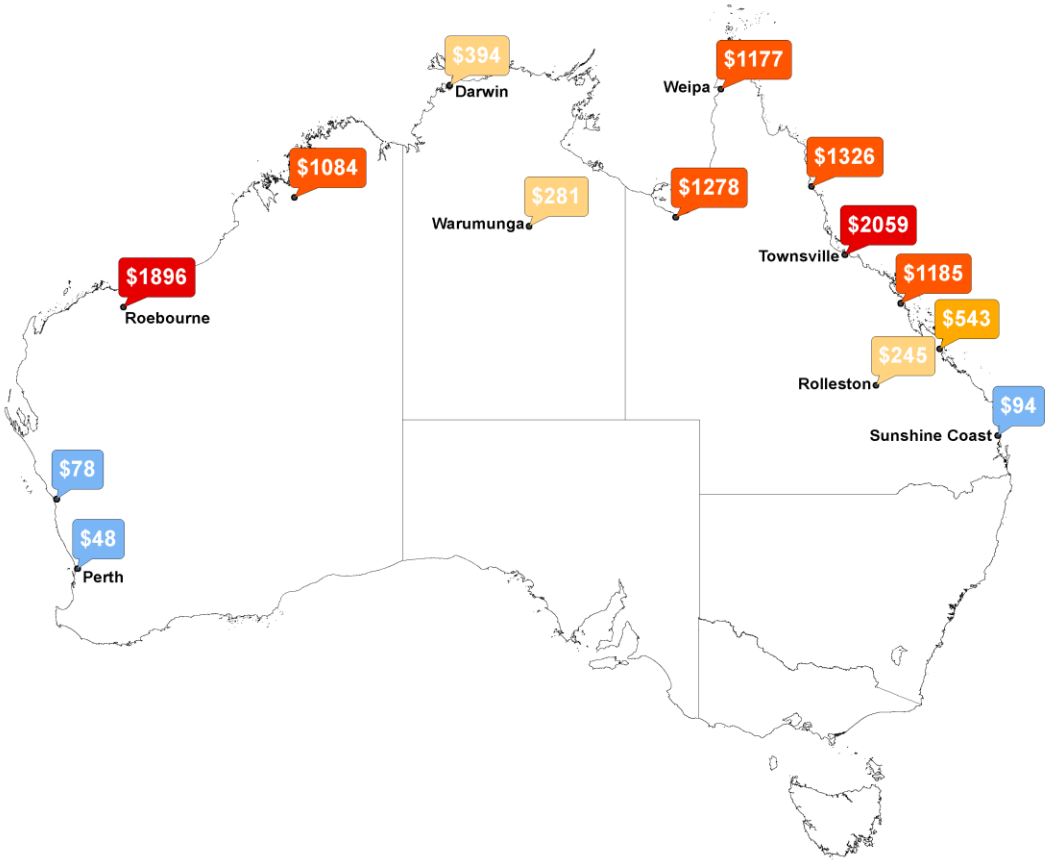
The estimated consumer premiums paid for cyclone cover have been estimated by comparing premiums in cyclone prone areas with premiums for similar risks in areas with negligible cyclone risk. The premiums were sourced by obtaining more than 4,000 quotations from the websites of insurers. The premium rates obtained were then applied to the total of all properties exposed in each location (provided by the Taskforce). The technical approach is described in detail in Section 4 of the report.

The figures shown in this report reflect the proposed definition for claims that would be eligible under the cyclone scheme. In particular we have excluded premiums and claim costs arising once the cyclone is downgraded to an ex-tropical low.

Key Drivers of the Premiums

The premiums charged depend in particular on the location of the property, its age and the type of construction. By way of example, Figure 2 shows for some locations the cyclone premiums for Home insurance for a common risk profile.

Figure 2 – A Selection of Home Online Cyclone Premiums by Location



Note: Based on a $350,000 sum insured, 2000 year of construction, brick dwelling

The cyclone premiums tend to be highest in the Pilbara on the west coast, and around Cairns and Townsville on the east coast.

Other drivers of premium variations include:

- **Flood risk:** risks located in close proximity to watercourses can attract materially higher premiums – sometimes in excess of $5,000
- **Proximity to coast:** premiums reduce for inland locations, reflecting that cyclones weaken over land
- **Age of dwelling:** older properties, and in particular pre-1980 properties that were built prior to the introduction of building standards for cyclone, can be charged 50% or more than newer properties
- **Construction:** timber and fibro houses attract higher premiums, with a metal roof more expensive than tiled
- **Tenure of customer:** insurers tend to manage pricing increases for existing customers by spreading increases over time to minimise the loss of business. When rates are increasing quickly, as they did in Northern Australia, this can lead to large differences in the premiums being achieved for new business and for renewing policies. We have estimated this difference can be as much as 30% in higher risk cyclone areas.

The nature of the variations in premium rates across different types of Strata properties tends to be similar to Home, although the rating process is generally less sophisticated. Strata premiums are usually based on sum insured, building age and construction, location (in broader regions) and often are individually assessed by an underwriter based on risk information provided by a broker.

Results - Current Cyclone Premiums

We have estimated that the current premiums paid by consumers in Australia for cyclone insurance are about $0.70 billion. This is split by type of coverage and region as follows:

Table 1 – Current Total Cyclone Premiums by Type of Coverage

	Region		
Class	Northern Australia	Other	Australia
	$m	$m	$m
Home	375	167	542
Contents	61	32	92
Strata	45	18	63
Total Cyclone Premium	481	216	697
Total Consumer Premium	1,000	6,927	7,927

Note: Premiums exclude GST, stamp duty and Fire Services Levy (FSL)

Hence the cyclone premium is estimated to be almost 10% of the total premiums paid by consumers (ie. $0.7 billion out of $7.9 billion total premiums).

The cyclone premiums for properties in Northern Australia are estimated to be $0.48 billion. These premiums compare with estimated long run annual claims costs of $0.29 billion (provided by the Taskforce based on catastrophe modelling). Hence the estimated long term loss ratio (claims divided by premiums) is estimated to be 59%. This is similar to the industry wide loss ratios for the Home, Contents and Strata classes for all perils combined. Relative to cost estimates from the models, therefore, this suggests that, in the aggregate at least, the business is priced comparably with other perils.

The historical claims costs in Northern Australia averaged over the last 20 years are estimated to have been around $0.12 billion per annum in current values. This is much lower than the modelled claims costs, which reflects at least in part the potential for much larger events to occur than in the recent history. We note that the variability of cyclone frequency is influenced by the El Niño – Southern Oscillation (ENSO) cycle, and the more recent 20 year period contain a larger number of El Niño periods where Australia experienced decreased rainfall and dryer seasons, thus reducing the frequency of cyclone occurrence. It is also plausible that the difference between the modelled and historical claims costs reflects that the modelled results are conservative. In this regard we note that for the results shown later in this executive summary and report we have assumed that the modelled costs are a good indication of the long term costs.

The estimated cyclone premiums of $0.70 billion nationally compare with estimated total annual claims costs of $0.49 billion (latter figure provided by the Taskforce), implying a long term loss ratio of 71%. The average claims costs over the last 20 years on a national basis are estimated to have been $0.12 billion per annum in current values – that is, almost the same as the Northern Australia figure.

The modelled claim costs indicate that there is a significant exposure to cyclone risk for regions outside of Northern Australia, in particular South-East Queensland and South West WA. Based on our estimates insurers have been charging lower cyclone premiums relative to risk in these regions, although there is greater uncertainty in assessing the cyclone premium in areas outside Northern Australia.

3 Direct Insurer Option

Under the direct insurer option consumers would purchase a cyclone insurance policy from the cyclone insurer. In order to be eligible for the cyclone insurance the consumer would be required to hold a non-cyclone risk insurance policy with a private insurer, and the private insurer would act as the agent of the cyclone insurer so that the consumer would need to deal with just one company.

As requested by the Taskforce, we have assessed the financial impact of the four scheme designs (Figure 1). The Taskforce asked for the modelling to assume 100% take up of the scheme for eligible policies.

We focus on the results for scheme designs 2 and 3 only in this executive summary – i.e. the Partial Funding and 30% Discount. The main body of the report shows the full results for all of the scheme designs.

The Unfunded (scheme design 1) shows the extreme case where the government fully subsidises cyclone claims – an unrealistic alternative. The Full Funding (scheme design 4) has not been shown in this summary because the modelling indicates that no overall savings in consumer premiums would be possible.

We have also considered a national scheme that covers all of Australia, along with the Northern Australia scheme. The executive summary focuses on the results for Northern Australia. The results for the national scheme are shown in the main body of the report.

The main body of the report also includes details of the assumed structure and cost of the reinsurance arrangements for the full funding option, and our assumptions regarding other scheme expenses. For the Northern Australia scheme, we have assumed purchase of a reinsurance programme up to $5 billion, equivalent to the estimated worst 1 in 200 year claims cost as advised by the Taskforce.

Key Metrics

The key metrics that have been used to illustrate the financial impact of each scheme are:

(c) The estimated reduction in cyclone premiums and total consumer premiums

(d) The probability that the aggregate government funding will exceed various levels ($1 billion, $2 billion and $5 billion) for each of three time periods (one year, four years and 10 years). For the 10 year option, we allow for any funds remaining in the scheme to be returned to government at the end of the 10 years.

The full range of metrics for each alternative is set out in the main body of the report. In order to calculate the probability metrics we have used simulation approaches to model multiple possible claims outcomes and with a probability assigned to each.

Reduction in Premiums – Direct Insurer Options

Table 2 shows the reduction in cyclone premiums and total consumer premiums for each option.

Table 2 – Premium Reduction for Direct Insurer Schemes for Northern Australia

Scheme Design	Current Cyclone Premium	New Cyclone Premium	% Reduction in Cyclone Premium	Current Total Premium	New Total Premium	% Reduction in Total Premium
	$m	$m		$m	$m	
1. Unfunded	481	81	83%	1,000	600	40%
2. Partially Funded	481	366	24%	1,000	885	11%
3. 30% Discount	481	181	62%	1,000	700	30%
4. Fully Funded	481	565	-18%	1,000	1,084	-8%

The Fully Funded scheme is not able to generate meaningful premium reductions for consumers. This reflects that relative to the modelled costs the existing insurer premiums appear to be reasonable.

The Partially Funded option generates an 11% reduction in average consumer premiums in Northern Australia. To the extent that the modelled claims costs are conservative, which is plausible, this limits the reduction that the Partially Funded option can generate. That is because the Partial Funding option does require consumers to pay these model costs, but without loadings for reinsurance and capital.

In order to achieve a 30% discount in consumer premiums, it is necessary to reduce the cyclone premiums by 62%.

Cost to Government – Direct Insurer Options

Table 3 shows the reduction in cyclone premiums and total consumer premiums for each option.

Table 3 – Cost to Government of Direct Insurer Schemes for Northern Australia

	Scheme Design 2 - Insurer Partially Funded	Scheme Design 3 - Insurer 30% Discount
Expected Capital Injeciton, averaged over long run ($m, p.a)	134	227
% Reduction in Total Consumer Premium	11%	30%
Probability of capital injection > $2bn		
In first year	1%	3%
Over 4 years	7%	14%
Over 10 years	18%	43%
Probability of capital injection > $5bn		
In first year	0%	1%
Over 4 years	2%	4%
Over 10 years	6%	16%

The range of costs to government and the likelihood of any level of cost vary widely based on the random nature of cyclone events.

4 Reinsurance Pool Option

As an alternative to a cyclone insurer, the Taskforce is considering a reinsurance pool option, whereby direct insurers continue to write full coverage policies and reinsure the cyclone risk (as defined) with the pool. The main structure considered is a per event excess of loss reinsurance, under which insurers (in total) pay the first $100m of any cyclone event and then the pool meets claims above that level. The pool may, in turn, buy its own reinsurance cover in the market and/or rely on the government balance sheet.

We have also considered an alternative referred to as a 'First Loss' scheme under which the reinsurance pool meets the first $30,000 (say) of a claim on each insured property with the direct insurer responsible for any amount above $30,000.

Reduction in Premiums – Reinsurer Options

Table 4 shows the reduction in cyclone premiums and total consumer premiums for each option.

Table 4 – Premium Reduction for Reinsurer Schemes for Northern Australia

Scheme Design	Current Cyclone Premium	New Cyclone Premium	% Reduction in Cyclone Premium	Current Total Premium	New Total Premium	% Reduction in Total Premium
	$m	$m		$m	$m	
Excess of Loss						
1. Unfunded	481	150	69%	1,000	669	33%
2. Partially Funded	481	363	25%	1,000	882	12%
3. 30% Discount	481	181	62%	1,000	700	30%
4. Fully Funded	481	558	-16%	1,000	1,077	-8%
First Loss $30,000						
1. Unfunded	481	293	39%	1,000	812	19%
2. Partially Funded	481	421	13%	1,000	939	6%
3. 30% Discount	481	181	62%	1,000	700	30%

For the excess of loss schemes the outcomes are similar to the estimated savings under the comparable direct insurer scheme.

In practice a key driver of the level of reductions in premiums that would be achieved under the reinsurer option will be the response of insurers. From the insurers' viewpoint, the scheme is similar to the existing arrangements that they operate under, except that reinsurance is purchased from the government entity at a lower cost than they currently pay. Our assessment of the insurer response is as follows:

- Insurers currently purchase reinsurance for all natural perils, including flood, earthquake, hail and windstorm. As such the amount that is currently viewed as the reinsurance cost for cyclone is in effect a notional allocation from this total reinsurance premium. The basis on which the reinsurance costs are allocated and included in prices varies across insurers.
- Hence, relative to the direct insurer option, it is not as certain how the lower reinsurance prices would flow through into the amounts paid by consumers. We have assumed that the difference between the current notional allocated reinsurance premium and the premium from the scheme would flow directly to insurers by way of lower premiums. In practice this may take several years to happen. Almost certainly the reduction achieved would vary significantly across customers.

The Partially Funded First Loss scheme generates savings of 6% in total premiums - i.e. less than the excess of loss arrangement, which reflects that the government takes on less of the risk.

Cost to Government – Reinsurer Options

Table 5 shows selected metrics for the Partial Funding and 30% Discount alternatives for Northern Australia.

Table 5 – Financial Impact of Reinsurer Schemes for Northern Australia

	Scheme Design 2 - Insurer Partially Funded	Scheme Design 3 - Insurer 30% Discount
Expected Capital Injeciton, averaged over long run ($m, p.a)	112	199
% Reduction in Total Consumer Premium	12%	30%
Probability of capital injection > $2bn		
In first year	1%	2%
Over 4 years	6%	13%
Over 10 years	16%	40%
Probability of capital injection > $5bn		
In first year	0%	1%
Over 4 years	1%	3%
Over 10 years	5%	14%

Compared with the corresponding direct insurer options, the reinsurer scheme has a slightly lower long-run cost to government and a slightly lower probability of significant capital injections.

5 Comparison of All Options

All 11 options that we have analysed for Northern Australia are shown below, in terms of the saving in total consumer premiums they deliver and the risk of the government outlaying more than $5 billion in aggregate across the 10 years.

Figure 3 – Saving in Total Premium vs Risk by Option for Northern Australia

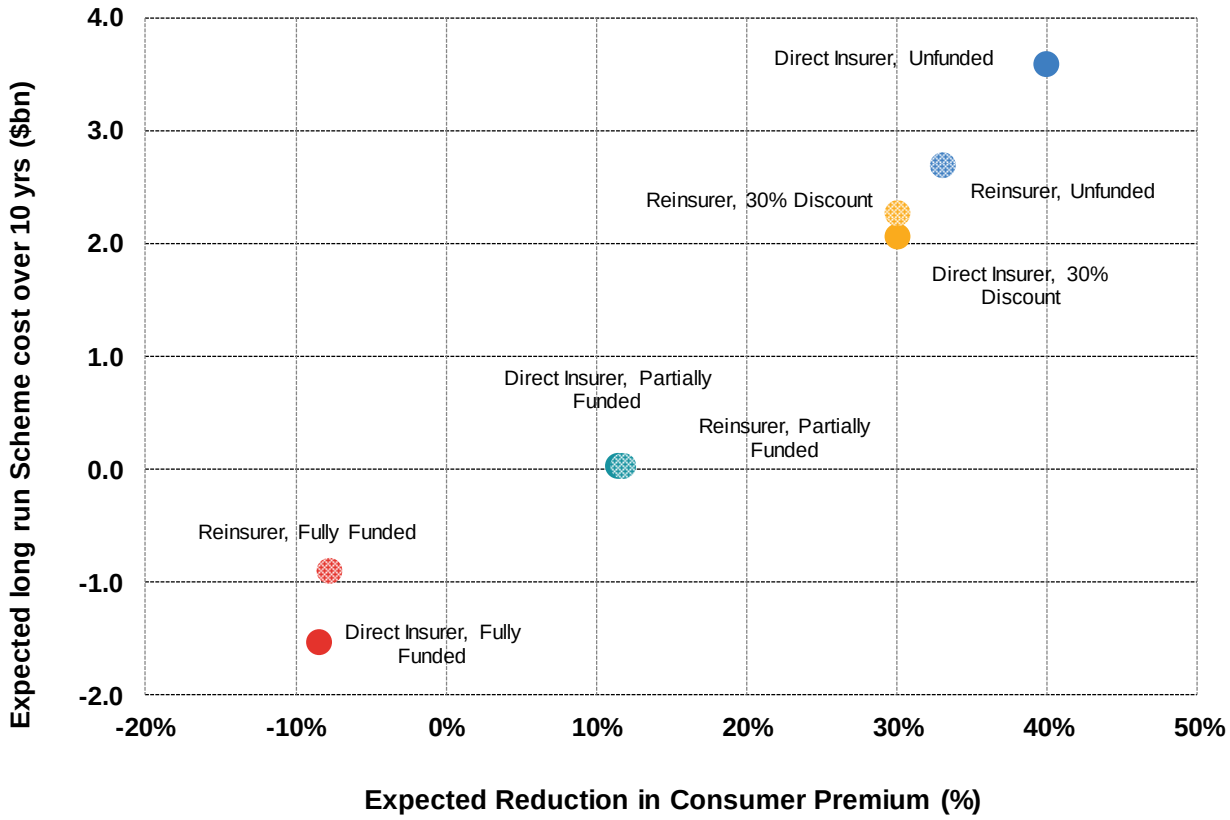


Figure 3 plots outcomes for the Northern Australia scheme, comparing the reduction in total consumer premiums (along the horizontal axis) with the long run scheme position over 10 years (vertical axis). This scheme position over 10 years reflects the overall long run cost to the government and is determined as the total capital injections made by the government over the 10 years less the net assets built up by the scheme during its existence. In Figure 3, a positive long run scheme cost represents a cost to government and a negative long run cost represents a return of capital to government.

Not surprisingly, Figure 3 shows a direct relationship whereby significant government costs are required if higher levels of saving in premiums are to be achieved.

6 Key Uncertainties

The estimation of cyclone claims costs and premiums is uncertain. It is important that our advice be considered in the context of the following uncertainties.

Firstly, there are uncertainties around the measurement of actual premiums charged by insurers and reinsurers:

- There are shortcomings with the exposure data used in the analysis. Whilst this impacts the numbers shown in this report in absolute terms, we believe the findings regarding the relative position of the current arrangements versus the scheme are reasonable.
- We have estimated the current premiums using online insurer prices, Finity benchmarks, and discussions with brokers. While the estimates will differ to actual premiums, we believe they are sufficiently reliable having regard to the purposes of the study.

- It was necessary to estimate the costs of the scheme purchasing reinsurance. Whilst our assumptions followed discussions with reinsurers and a reinsurance broker, the cost of reinsurance is inevitably a negotiation and it is possible that the costs could be higher or lower in practice.

Secondly, there are uncertainties relating to estimating the long run cost of cyclones:

- The occurrence, cost of cyclones, and location of damage of a particular cyclone in Australia is difficult to determine and varies under different climate conditions. A severe cyclone occurring in Australia is a rare event and it is inherently difficult to estimate the severity and location of a cyclone, and the insured damage that results. We have relied on the modelling results provided by the Taskforce.

Finally, the actual outcome of any scheme over any period of years will have a great deal of random variation. Regardless of the accuracy of estimated long run costs, there will periods of lower cost and periods of much higher cost.

Part II Detailed Findings

This final draft report is provisional, provided for discussion purposes and should not be relied upon for making commercial decisions. No liability to any party will be accepted for the consequences of relying on the contents of this draft report.

1 Introduction

1.1 Background

The Taskforce is assessing the feasibility of the Federal Government setting up a direct insurer or a reinsurer of cyclone damage, with the objective of reducing Home, Contents and Strata premiums in Northern Australia.

The Taskforce has asked Finity Consulting Pty Limited (Finity) to assist with a number of aspects of its assessment of the proposed alternative schemes including:

Part (A)

1. The current premium pool for cyclone risk
2. The insured industry cyclone claims costs over the past 20 years.

Part (B)

1. The likely capital requirements and cost to the Government of implementing an insurer or reinsurer
2. The likely reduction in consumer premiums that could be achieved.

This is our second draft report and provides our assessment of the elements listed under Parts (A) and (B). A final report will be provided at a later date that responds to feedback and questions from the Taskforce.

We understand that our involvement and report findings may be referenced in the Taskforce's own report and potentially attached to that report and be publicly available.

1.2 Data provided for our review

The Taskforce provided us with a range of information for our assessment. The full list of information provided is set out in Appendix A. The information was supplemented with various meetings, discussions and exchange of emails with the Taskforce members.

Whilst we have not independently verified the accuracy of the information provided, we did undertake reasonableness checks. We noted some anomalies with the exposure data that was provided by the Taskforce – specifically the sums insured were overstated in some CRESTA zones. With the agreement of the Taskforce we have rescaled the sums insured to Finity benchmarks. The pro-rata adjustment has also been applied to the modelled claims results so that the premiums and claims are based on like-with-like exposure assumptions. Similar adjustments have been made to the amount of reinsurance and its cost. All results in our report are shown after applying the pro-rata adjustment.

1.3 Support from Guy Carpenter Australia

We received support from Guy Carpenter Australia (Guy Carpenter) in undertaking our review. Specifically, Guy Carpenter assisted us with the design and pricing of reinsurance arrangements that may be purchased by the alternative schemes. Notwithstanding Guy Carpenter's support, Finity takes responsibility for the reasonableness of the reinsurance assumptions adopted.

1.4 Structure of our report

The remaining sections of this report set out our detailed analysis as follows:

Section 2	Sets out our understanding of the schemes, including the various alternatives
Sections 3 to 7	Our detailed analyses of the aspects of the work as described in Section 1.1 are set out in Sections 3 to 7. For each section there is an accompanying appendix that provides more detailed assumptions and results.
Section 8	Describes the reliances and limitations of this report.

2 Scheme Design

This section summarises the possible scheme design as advised to us by the Taskforce. The more complete documentation of the design provided by the Taskforce is set out in Appendix A.

2.1 Classes of Insurance Covered

The scheme would cover Home, Contents and Residential Strata properties. The scheme would not cover commercial or other assets, such as motor vehicles.

2.2 Definition of Cyclone Costs

The scheme would apply to any named tropical cyclone. Only claims costs that are incurred when the cyclone is Category 1 or above would be included. The scheme would not cover:

- claims that emerge far from the track of the cyclone, with the distance threshold varying by event according to its size
- claims that emerge following the decay of an event to an ex-tropical low.

Claim types would include storm surge, flooding (flash flood and riverine flood), wind, rain and water ingress and any other damage where the proximate cause is the cyclone. The nature of the coverage would include standard features such as temporary accommodation and demolition/debris removal.

2.3 Geographic Coverage

At the Taskforce's request, we have assessed two possible schemes, a National Scheme and a Northern Australia Scheme.

- Scheme 1: National Scheme: Includes all of Australia with no exceptions.
- Scheme 2: Northern Australian Scheme: All regions north of the Tropic of Capricorn (23.5 parallel), including council areas that intersect the Tropic, and coastal local council areas above the 25th parallel in Western Australia.

2.4 Take-up

We have been asked by the Taskforce to assume 100% take-up of the scheme. The purpose of this assumption is to show the boundary of premium impacts and government costs. It is important to note that an optional scheme with less than 100% take-up will not necessarily cost less than with 100% take-up. This is because only high risk properties being charged high premiums would be likely to take up the scheme.

The Taskforce has subsequently asked us to assume that the relationship with private insurers (whether as agents in the direct insurer model or using the reinsurance model) would be on a whole of portfolio basis. That is, if an insurer decides to participate in the scheme it must participate for the whole of its business.

The decision making process would likely be difficult. Based on currently stated views many insurers would probably resist joining the scheme. Over the medium term, however, if the scheme is charging lower premiums for most risks, commercial logic would mean that most if not all insurers should participate.

2.5 Direct Insurer or Reinsurer

We have been asked to consider three scheme structures, a direct insurer option and two reinsurer options.

For the Direct Insurer and Reinsurer Excess of Loss options we have assumed an industry retention of $100 million per event. This amount is set high enough to limit how frequently the scheme is called upon, and low enough such that insurers do not explicitly need to price for material cyclone risk in their premiums.

2.5.1 Direct Insurer

Under the direct insurer option consumers would purchase an insurance policy from the cyclone insurer alongside a policy that covers all other risks from a private sector insurer. In order to be eligible for the cyclone insurance the consumer would be required to hold a non-cyclone risk insurance policy.

The cyclone insurer would source the policies via the use of the private insurers as agents. A commission would be paid to the insurers. The cyclone insurer would also engage insurers to manage the cyclone claims.

2.5.2 Reinsurer – Excess of Loss

Under this option the cyclone scheme, probably set up as a reinsurance pool, would provide treaty catastrophe excess of loss reinsurance to all direct insurers.

Insurers' retentions would be set at relatively low levels. The retentions we have assumed are set out in Section 7.

2.5.3 Reinsurer – First Loss

The second reinsurer option relates to the provision of first loss cover, whereby the cyclone scheme reinsures the first $30,000 of each claim on each insured property. Any claim in excess of that amount is covered by the insurer. We have also considered thresholds of $5,000 and $10,000.

This scheme has not been considered on a National basis.

2.6 Underinsurance

The estimates shown in this report are based on the following levels of non-insurance and underinsurance:

- Non-insurance:
  - Home 10%
  - Home Contents 25%
  - Apartment Contents 30%.
- Underinsurance:
  - Home 15%
  - Contents 25%.

The exposure data provided to us by the Taskforce for the purpose of our review had been adjusted for these levels of non-insurance and underinsurance.

2.7 Funding Scenarios

As requested by the Taskforce, we have assessed the impact of the following four alternative scheme designs:

Figure 2.1 – Alternative Scheme Designs Considered

1. Unfunded	• No premiums collected, no capital, no reinsurance, claims funded by government guarantee.
2. Partially Funded	• Premiums cover expected claims costs and expenses, no reinsurance or capital. Government funds shortfall between reserves and actual costs.
3. 30% Discount	• Premiums set at 30% below current levels. May purchase reinsurance. Government funds shortfall between reserves and actual costs.
4. Full Funding	• Charges "commercial" premiums, fully capitalised, buys reinsurance.

As requested by the Taskforce, for the first loss reinsurer we only consider the first three options.

2.8 Tax

Based on the instructions of the Taskforce we have assumed that the cyclone entity would be taxed as though it were a normal private company – that is, it would pay corporate income tax on the profits arising in the scheme.

Where claims costs are shown in this report they include GST and are net of Input Tax Credits (ITC).

The exposure information on insured properties that the Taskforce provided to us included the sums insured. These sums insured were net of GST and have been increased by 10% for our analysis.

3 Recent Cyclone Claims Costs

This section sets out our assessment of cyclone claims costs over the last 20 years. We describe the approach we have adopted to estimate these costs and then summarise the results. Appendix B provides more detail of our analysis.

It is important to note that in the context of cyclone experience, 20 years is 'recent'. A much longer period of history would be needed for the historical experience to give a fair representation of expected future cyclones.

3.1 Our Approach

Our assessment of historical cyclone costs involved the following steps:

1. **Insurance Council of Australia's (ICA's) Catastrophe List**: The starting point was the ICA's catastrophe list, which shows the cost of individual catastrophe events from 1967 to 2015. The costs are shown for all insurance classes combined. The original costs are shown as well as a current values estimate adjusted for inflation, changes in population and changes in building standards.
2. **Adjustment for missing cyclones**: We reviewed data available of named cyclones in the last 20 years and identified those that made landfall as a Category 1 cyclone or higher, but were missing from the ICA list. We estimated the cost of these events.
3. **Exclusion of costs not meeting the cyclone definition**: For each event we estimated the proportion of the cost that would not meet the proposed cyclone definition. In particular, we excluded costs relating to flooding from precipitation after the cyclone had transitioned to an ex-tropical low (i.e. wind speeds below the level needed for a Category 1 cyclone).
4. **Allocation of cost by class of insurance**: We separated the remaining cost into components relating to Home and Contents, Strata and other classes. The costs for other classes, which are excluded from the scheme, were excluded.

3.2 Cyclones Missing from Insurance Council List

We identified named cyclones from the last 20 years that made landfall at some stage as a Category 1 event or higher. We compared the cyclones with the ICA's catastrophe list and added to the list any that were missing. We estimated the costs for each event based on the extent of population where the cyclone made landfall, the strength of the event and review of newspaper and other reports of the event. The costs reflect all classes of insurance combined, including commercial. The table below shows the events added that had a cost in excess of $50 million. The full list of added events is shown in Appendix B.

Table 3.1 – Cyclones added to ICA Catastrophe List with a cost of >$50 million

Cyclone	Year	Cyclone costs all classes ($m)	Category of cyclone strength at time of landfall
Sid	1997	360	1
Ingrid	2005	52	5
Lam	2015	82	4
Olwyn	2015	100	3

Only one of the missing events was larger than $100 million. This is not surprising as the ICA listing would be expected to include most, if not all, major events. Note that most of the cost of Cyclone Sid related to flooding once the cyclone transitioned to an ex-tropical low and would have been excluded from the scheme. We exclude these costs in our analysis as described in Section 3.3.

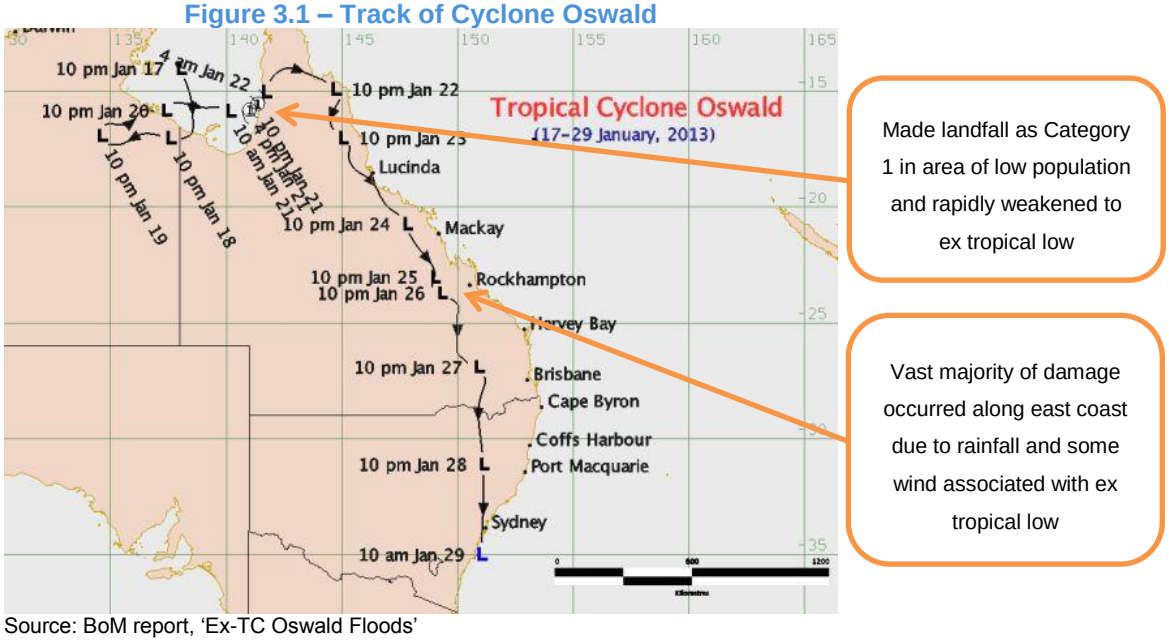
3.3 Exclusion of costs not meeting the cyclone definition

3.3.1 Cyclone Oswald

We have used Cyclone Oswald to illustrate the adjustments made to costs shown in the ICA catastrophe list.

Cyclone Oswald is shown in the catastrophe list as having a cost of $1.3 billion. The track of the cyclone is shown below:

Figure 3.1 – Track of Cyclone Oswald



Source: BoM report, 'Ex-TC Oswald Floods'

Oswald crossed the coast at an area of low population. It then tracked southwards as an ex-tropical low. Most of the damage that flowed was for riverine flood and flash flooding down the east coast of Australia.

We have assumed that 99% of the costs of this event would have been excluded – that is, the cost covered by the scheme would have been only $13 million. Judgement was needed to estimate the cyclone costs to exclude for Oswald and for other cyclones. Factors that we considered were the details of the event, its path and strength (information gathered from Bureau of Meteorology reports), and newspaper and other reports of the nature of damage associated with the event.

3.3.2 Summary of Excluded Costs

Table 3.2 summarises the cyclone costs that we have excluded according to the size of the events. The full list of cyclones and the amounts we have excluded for each are shown in Appendix B.

Table 3.2 – Excluded costs, by size of cyclone (all classes combined)

	Costs (in millions, inflated to Dec-14)			
	Event costs	Included	Excluded	% Excluded
	$m	$m	$m	
< $100 million	1,065	503	563	53%
$100 - $500 million	658	295	363	55%
> $500 million	4,707	3,397	1,310	28%
Total	6,430	4,196	2,235	35%

In aggregate we have excluded 35% of the costs shown against the cyclones. The proportion of cost excluded varies significantly for different cyclones. For example, for Yasi none of the cost has been excluded, whereas for Oswald the comparable figure is 99%.

3.4 Allocation of Costs by Class

The allocation of the costs by class is based on information that has been published by the ICA from time to time and relies on benchmarks where this information was not available. The allocation of each event is set out in Appendix B. On average 47% of the aggregate cyclone costs are assumed to relate to Home, 9% to Contents and 3% to Strata. The rest (42%) relates to insurance classes that would be excluded from the scheme (commercial property, motor, marine etc.).

We had only limited data on the Strata claims costs. Catastrophe modelling implies similar damage ratios for Home and Strata and this is consistent with the limited experience that we reviewed. The Strata allocation is however more uncertain than the allocation to Home.

3.5 Summary of Results

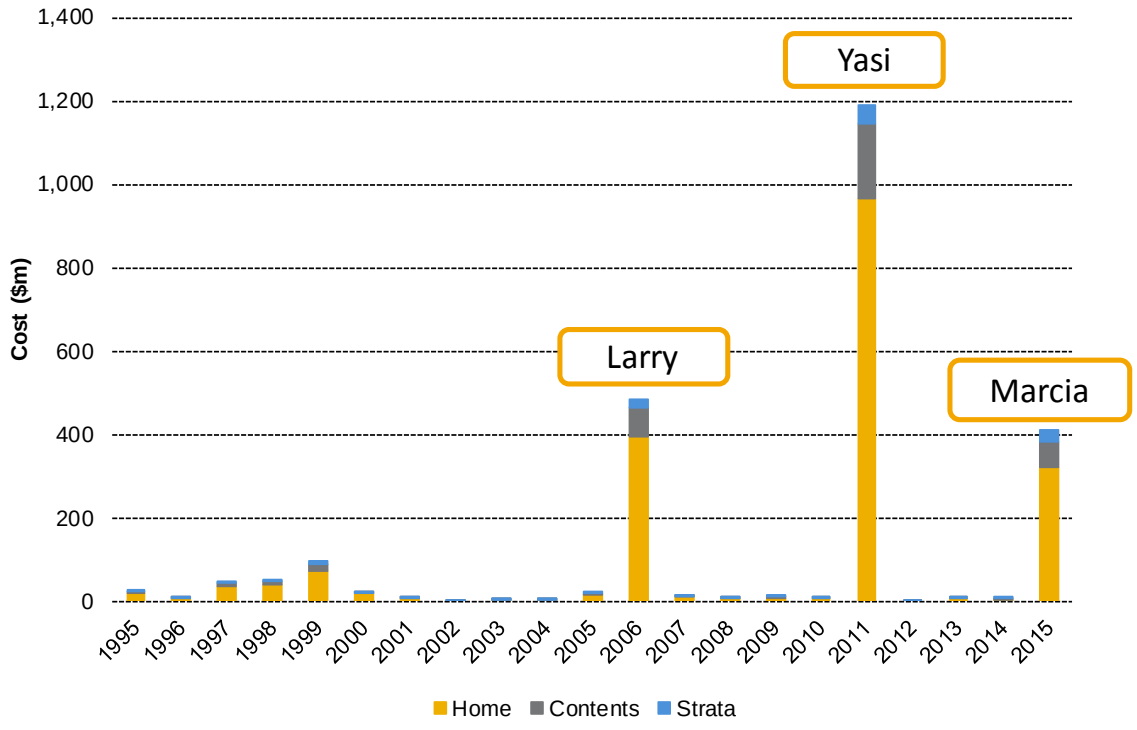
Table 3.3 shows for each of the last 20 years the number of cyclones and the cost that we estimate would be included in the scheme for each of Home, Contents and Strata. The results are shown for Northern Australia and for a National scheme.

Table 3.3 – Estimated Scheme Cyclone Costs by Year

		Australia wide costs ($m)				Northern Australia only costs ($m)			
Year	Number of Cyclones	Home	Contents	Strata	Total	Home	Contents	Strata	Total
1995	4	22	4	2	28	20	4	2	25
1996	7	6	1	1	8	6	1	1	8
1997	3	36	7	3	46	36	7	3	46
1998	4	39	7	3	50	39	7	3	50
1999	5	81	16	7	104	74	14	6	95
2000	4	19	4	2	24	17	3	1	22
2001	5	7	1	1	9	7	1	1	9
2002	1	0	0	0	1	0	0	0	1
2003	3	1	0	0	2	1	0	0	2
2004	5	2	0	0	2	2	0	0	2
2005	2	17	3	1	22	17	3	1	22
2006	7	393	73	19	484	393	73	19	484
2007	4	11	2	1	14	11	2	1	14
2008	2	6	1	1	8	6	1	1	8
2009	4	9	2	1	11	9	2	1	11
2010	5	7	1	1	9	7	1	1	9
2011	4	967	178	44	1,189	967	178	44	1,189
2012	2	1	0	0	1	1	0	0	1
2013	4	7	1	1	10	7	1	1	9
2014	4	5	1	0	6	5	1	0	6
2015	4	325	62	28	415	322	62	27	411
Total	83	1,961	366	114	2,442	1,948	364	113	2,424
Avg per annum	4	93	17	5	116	93	17	5	115

The same results are shown graphically in Figure 3.2 below.

Figure 3.2 – Estimated Scheme Cyclone Costs by Year



The total cost of cyclone damage as specified for the scheme has been $2.4 billion over the last 20 years, or just over $0.1 billion per annum on average. Most of the cost in this period relates to three events (Larry in 2006, Yasi in 2011 and Marcia in 2015).

It is very likely that the long term average annual costs would be materially higher, as the catastrophe modelling work provided by the Taskforce suggests ($0.5 billion per annum, Australia-wide). This reflects that events significantly larger than those that have occurred in the last 20 years are possible – for example a direct hit on Townsville, or a cyclone impacting an area of high concentration such as the Gold Coast. Cyclone Tracy is an example of a much more severe event.

There has been an average of almost 4 cyclones per annum that we assess as having some cost under the scheme definition of cyclone. However many of these involve limited cost. There have been around 2 events per annum over the last 20 years involving cost of more than $1 million. This is broadly in line with the 2.5 (2.3 for Northern Australia) events per annum indicated by the catastrophe modelling work provided by the Taskforce.

There was not a single year in the last 20 when there would have been no cyclone cost, although in some years the costs were very low.

The average annual costs in Northern Australia are almost identical to the national experience. Over the 20 year period there have been no material cyclones causing damage south of the Northern Australia definition. It is widely accepted, however, that there is significant exposure, both in South East Queensland extending down into Northern New South Wales and also in the south-west of Western Australia. The modelling indicates that such events, while infrequent, may be very large, particularly from the Sunshine Coast down to the Gold Coast.

3.6 Key Uncertainties

The following key uncertainties relate to our estimates of the historical costs:

- We needed to estimate the costs of events missing from the ICA Catastrophe List. Whilst the cost of these individual events may be significantly different from the levels we have assumed, the impact on the overall cost is expected to be modest, noting that these events are thought to be minor.
- We needed to estimate the proportion of the industry cost that relates to each class. This involved benchmarks and hence the allocation should be regarded as approximate.
- We needed to estimate the proportion of costs that would not meet the proposed definition of “cyclone” cost. Inevitably this involved estimation but we believe the assessment is adequate for the purposes of showing the broad level of past costs that would have arisen.
- We needed to split some of the events between Northern Australia and the rest of the country. These splits are approximate.

4 Current Premium Pool

This section sets out our assessment of the current premium pool paid by consumers for cyclone cover. We describe the approach we have adopted and summarise the results.

4.1 Our Approach

The calculation of the cyclone premium pool reflects assumptions for the underlying exposure profile and the algorithms used to set cyclone premiums:

Exposure Profile	• The mix of properties in each Statistical Area 1 (SA1), according to their age, sum insured, and the nature of the property • This is the same exposure profile that has been used to estimate the expected cyclone claims costs
Cyclone Premium Algorithm	• An algorithm that can be used to calculate the cyclone premium for any individual risk, based on its location and property characteristics • We have estimated this algorithm by reviewing the premiums charged by insurers for different types of risks in different locations

We have assessed the current premium pool for each SA1 (which group around 200-800 persons). The results are aggregated across SA1s to provide results for larger regions and overall, as needed. We were provided with a file by the Taskforce that provided details of the exposure profile in each SA1. This is the same exposure data that has been used by the Taskforce to model the expected cyclone claims costs. In this way our premium pool and the claim cost estimates are directly comparable.

For Home insurance we collected around 4,000 online premium quotes (and 2,000 for Contents) from each of five insurers. We have used these quotes to derive an estimate of the algorithm used to price for cyclone risk. The algorithm makes use of the following factors:

- **Property specific factors:** sum insured, construction type, age of building
- **Location specific factors:** latitude, distance to coast, elevation, riverine flood risk

There were a number of challenges in using available insurer premium data to estimate the cyclone premium pool. These challenges and our approach to them are summarised in Table 4.1.

Table 4.1 – Our approach to using insurer premiums available online

Challenges in using insurer online premiums	Our Approach
Premiums vary materially across areas, by individual addresses within an area and across property types. This can bias the sample results.	We have used Finity's proprietary perils risk tools (called finperils) to identify drivers of variations in premium due to the perils risk. We have "normalised" the sampled prices for these influences. We allow for the property type influences in interpreting and applying the results from the sample.
Riverine flooding can be a large cost for many properties in North Australia. Some of this cost would be covered by the pool and some would be excluded.	We used finflood and NFID data to identify flood exposed properties. We have assumed that 20% of the flood cost will be covered by the pool for different risks.
Premiums can vary significantly between insurers for the same risk.	We collected premiums from up to five insurers in each State. We have focused our assessment of the cyclone premium towards the lower of the insurer prices, rather than the average. This reflects that consumers are price sensitive. To reflect current market share, premiums were also targeted towards the leading brands in the State.
The premiums charged by an insurer online are not necessarily indicative of the premiums the insurer would charge for existing customers, due to discounting for new customers and capping of price increases for existing customers.	We assess that there is currently limited discounting of premiums in cyclone prone areas. In this regard the online premiums do not need adjustment. We do expect that insurers would have capped the price rises for some existing customers. Following review of the level of annual price increases in online premiums and our broad knowledge of common capping processes we reduced the online premiums by up to 30% in high cyclone risk areas. This is a significant reduction and suggests that existing policyholders can pay materially lower premiums than those that apply to new policies in cyclone zones.

The analysis for Strata was necessarily more approximate than for Home and Contents. This reflects that it was more challenging to obtain details of market prices. We estimated market pricing of Strata following discussions with some relevant brokers and underwriters. The insurer practices for pricing Strata risks are typically not as sophisticated as for Home in relation to the use of location specific factors, including riverine flood. Standard premiums are based on sum insured, building age and construction, along with location (in broad areas). It is common, though, for an underwriter to make an individual risk assessment based on risk information provided by a broker or on a building inspection.

4.1.1 Allowance for GST, Stamp Duty, Fire Service Levies

We have shown the premiums net of GST, stamp duty and fire service levies. This means these components do not need to be deducted when comparing premium levels to claims. But it does mean that the retail cyclone premiums paid by consumers would be around 20% higher than those shown due

to GST and stamp duty. In NSW a further 17% is added for fire service levy. The government charges in each state are set out in Appendix D.

4.2 Profile of Insured Properties

Data Provided by Taskforce

To estimate the size of the premium pool it is necessary to know the number and sums insured of insured properties in cyclone areas. For the purpose of our assessment the Taskforce provided us with the results of a study they separately commissioned that provided estimates of insured properties exposed to cyclone in Northern Australia (broadly, areas above the Tropic of Capricorn) and elsewhere. The results were available by Statistical Area 1 (SA1). The Taskforce had adjusted the exposure for non-insurance and underinsurance.

The same exposure file was used by catastrophe modelling firms who have separately provided the Taskforce with estimates of cyclone claims costs.

We noted some anomalies with the exposure data – specifically the sums insured were overstated in some zones. With the agreement of the Taskforce we have rescaled the sums insured to Finity benchmarks. The pro-rata adjustment has also been applied to the modelled claims results so that the premiums and claims are based on like-with-like exposure assumptions.

The exposure profile provided by the Taskforce included information for insured properties by SA1 including sum insured, age of building and the type of wall and roof construction. Table 4.2 summarises the aggregate sums insured by type of cover for Northern Australia and for the National Scheme, after the adjustment referred to earlier.

Table 4.2 – Profile of Insured Exposure

Class	Number of Risks	Average Sum Insured	Total Sum Insured
		$	$bn
Northern Australia			
Home	330,000	440,000	145
Contents	280,000	80,000	22
Strata	10,000	1,030,000	10
All Classes	620,000	290,000	180
National			
Home	6,430,000	420,000	2,701
Contents	5,490,000	90,000	494
Strata	140,000	1,680,000	235
All Classes	12,060,000	280,000	3,377

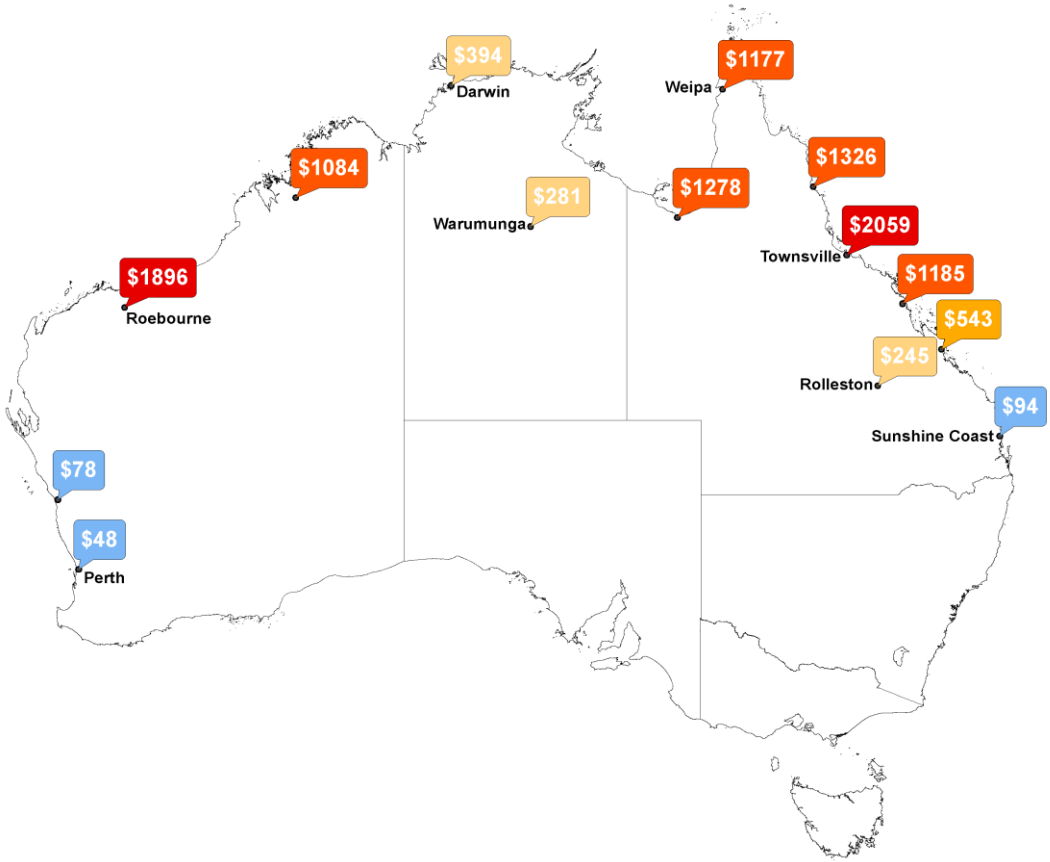
4.3 Insurer Premiums

The key drivers of cyclone premiums are the location of the property and the characteristics of the building being insured.

4.3.1 Impact of location

Figure 4.1 illustrates the extent of differences in the Home online premium for cyclone cover across various locations in Northern Australia, based on our analysis of the online prices charged by insurers. The premiums shown reflect individual quotes that we obtained for a standard Home risk in different locations.

Figure 4.1 – Cyclone Online Premium by Location for Home

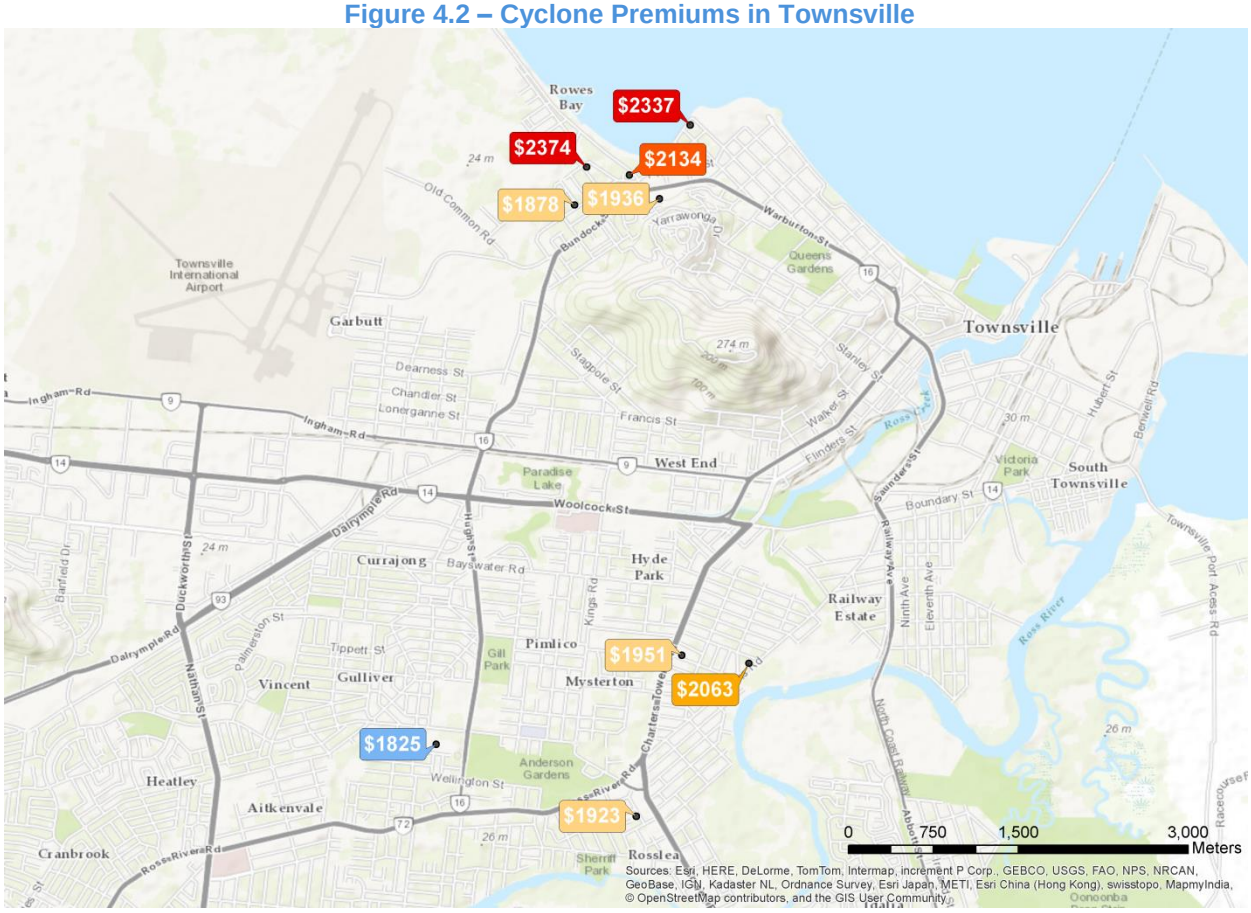


Note: Based on a $350,000 sum insured, 2000 year of construction, brick dwelling.

The highest premiums tend to be around the Pilbara region on the west coast and around Cairns/Townsville on the east coast.

There are also significant variations in premium within a single area. By way of illustration, Figure 4.2 shows differences in the Home premium for cyclone cover in the Townsville area, based on our assessment of the prices charged by insurers.

Figure 4.2 – Cyclone Premiums in Townsville



Note: Based on a $350,000 sum insured, 2000 year of construction, brick dwelling.

The premiums are generally higher for properties closer to the coast, for properties at low elevations and for properties close to rivers. For example in Townsville above, premiums are around 30% higher for properties near the coast than those that are inland and away from rivers.

The variations by location are similar for Home and Contents. The location level rating of Strata tends to be less granular.

4.3.2 Allowance for Riverine Flood

The highest premiums in cyclone prone areas tend to be for properties also having riverine flood exposure. By way of illustration, the following table shows premiums for properties that are 10km inland from the coast near Prosperine. We used 10km so that the storm surge risk is reduced. We show the elevation and proximity of the properties to the river in the table below.

Table 4.3 – Cyclone Premium 10km inland near Prosperine

Address	Elevation Difference to Drainage/River (m)	Proximity to Nearest Drainage/River (m)	Premium
226 … Strathdickie 4800 QLD	3	298	$4,151
103 … Sugarloaf 4800 QLD	16	401	$1,700
5 … Strathdickie 4800 QLD	13	602	$1,192
20 … Sugarloaf 4800 QLD	20	360	$1,168
177 … Strathdickie 4800 QLD	140	1,447	$919

The high premiums for the risk of riverine flooding are clear. Some of this risk would be captured by the cyclone scheme, noting that the scheme includes flood costs arising from precipitation whilst the cyclone

is classified as Category 1 or greater. Thus it was necessary for us to assume a proportion of the riverine flood premium that would be captured by the scheme. Key considerations affecting our assessment were:

- The further inland the location, the less chance the riverine flood risk would be captured by the scheme, noting that the probability increases that the cyclone would have made the transition to an ex Tropical low
- Most riverine flooding does not relate to cyclones, noting there are many other days of heavy rain in the region.

We have assumed that 20% of the riverine flood risk near to the coast would be captured by the scheme. Whilst this assumption involves judgement, in our view it is of the right order of magnitude. The amount of riverine flood premium that we have included is $12 million, so even a doubling of this cost is not particularly material in the context of the scheme overall.

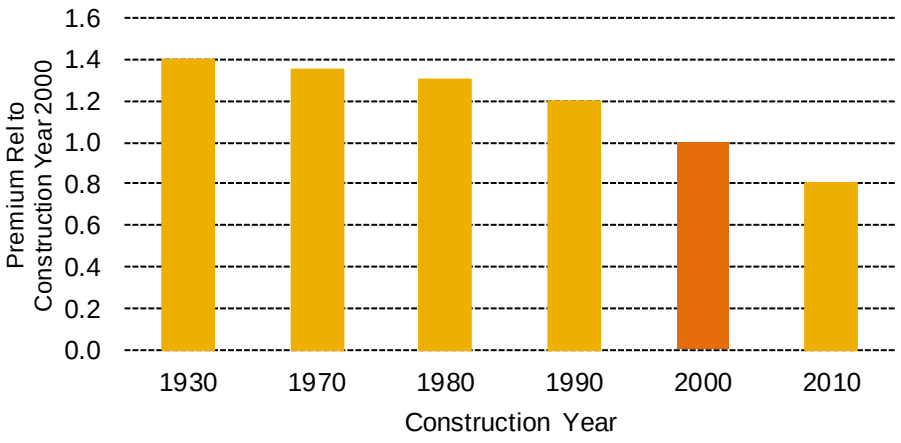
4.3.3 Impact of nature of building

For Home, the key drivers of cyclone premium besides the location of the property are:

- **Sum insured:** generally the cost per $1,000 sum insured reduces as the sum insured increases.
- **Year of construction:** with pre and post 1980 a key threshold, linking to changes in building standards
- **Wall construction:** wood and fibro properties tend to have higher premiums
- **Roof construction:** this appears to be of lesser importance in insurer pricing, although metal rooves tend to attract higher premiums than tiled rooves.

Of the above factors, the year of construction is the most important. Figure 4.3 shows our estimate of the variation in premium by age of property, based on properties in Townsville.

Figure 4.3 – Estimated Average Cyclone Premium by Construction Year in Townsville



Note: Based on a $350,000 sum insured, Townsville, brick dwelling.

We estimate the cyclone premium charged by insurers for properties constructed prior to the change in the building code is on average around 50% higher than for newer properties.

The shape of the rate structure for Contents broadly aligns with the Home coverage.

For Strata, premiums can vary significantly according to the characteristics of the property. Typically Strata insurers will ask a much broader range of questions about the nature of the risk relevant to its ability to withstand wind risk. That said, the main drivers of the premium charged appear to be the size of the risk, with lower rates applying to high sums insured, and the age of the building. In some cases the premiums can be materially higher for properties in close proximity to the coast. Besides the properties in immediate proximity, the distance to coast is not a material factor.

The larger premiums associated with Strata can also provide scope to undertake inspections of individual properties and the premiums can vary materially for a risk according to its quality. For our study we did not have as much information as insurers would typically have about the nature of the insured properties. Our estimates are intended to reflect the average premiums that insurers may charge for the types of risk.

4.4 Estimated Pool

4.4.1 Overall Pool

Table 4.4 shows our estimate of the cyclone premium pool by type of cover across broad regions.

Table 4.4 – Estimated Cyclone Premium Pool

	Class			
Region	Home	Contents	Strata	Total
	$m	$m	$m	$m
Northern Australia				
Queensland	310	48	21	379
Western Australia	49	9	17	75
Northern Territory	16	4	7	27
Total Northern Australia	375	61	45	481
Other				
East Coast	149	21	11	181
Western Australia	18	10	6	35
National Total	**542**	**92**	**63**	**697**

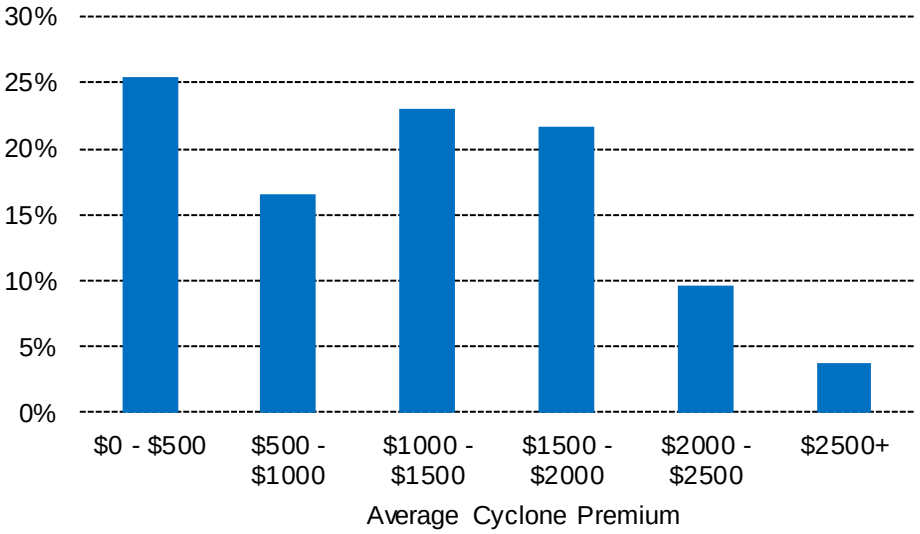
The premiums for properties in North Australia are estimated to be $0.48 billion. These premiums compare with estimated annual claims costs of $0.29 billion (latter figure provided by the Taskforce). The implied loss ratio (being the ratio of claims to premiums) is 59%, which is broadly in line with the level of loss ratios insurers achieve on these classes across all perils and indicates the premiums being charged are appropriate, at least in the aggregate, relative to the results of the cyclone models.

The estimated premiums of $0.70 billion nationally compare with estimated total annual claims costs of $0.49 billion (latter figure provided by the Taskforce), and imply a loss ratio of 71%.

4.4.2 Distribution of Cyclone Premiums

We have used the results by SA1 to provide an indication of the distribution of cyclone premiums in Northern Australia. The average Home premium for cyclone in Northern Australia is around $1,155 per dwelling. Figure 4.4 shows the distribution of Home premiums by SA1 that make up this average.

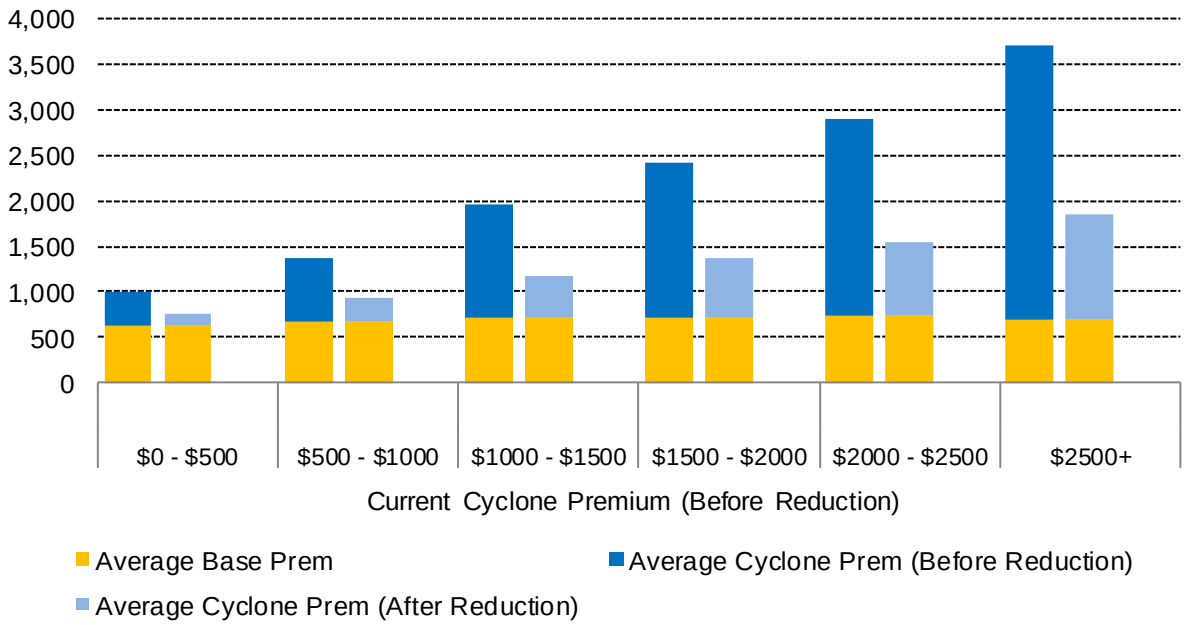
Figure 4.4 – Distribution of SA1s by Average Cyclone Premium for Home



In around 4% of SA1s the average cyclone premium is estimated to be more than $2,500. The premium is less than $500 in 25% of SA1s.

The broad distribution of current premiums also means that the extent of any reduction from the scheme will not be the same for each policyholder. As an example, Figure 4.5 shows for each of the groups in Figure 4.4 the impact of the '30% Discount' scheme (Scheme 3) as described in Section 2.

Figure 4.5 – Average Reduction in Home Cyclone Premium under Scheme 3 as Example



Note: Premiums shown above are before taxes and duties

Under this example, as the Home cyclone premium increases, the dollar amount of premium savings for consumers will also increase. Table 4.5 summaries the dollar decrease in the premium paid by consumers under this particular scheme.

Table 4.5 – Average Change in Home Premium under Scheme 3 as Example

Average Premium Paid by Consumers Before Reduction	Average Premium Paid by Consumers After Reduction	% Insured Dwellings
$1,000	$760	25%
$1,370	$930	17%
$1,950	$1,180	23%
$2,420	$1,360	22%
$2,890	$1,550	10%
$3,710	$1,840	4%

The above table shows that under this scheme as an example, in targeting a 30% average overall reduction to the premiums in North Australia, most consumers would receive a modest reduction in their Home premium paid, and a small proportion of insureds would get a larger reduction of more than 50%.

4.5 Reasonableness Checks

4.5.1 Benchmarking to relativities from AGA report

We have used the Australian Government Actuary's (AGA's) reports into Home (2014) and Strata (2014) insurance in North Queensland to benchmark the cyclone premiums that we have derived. Table 4.6 compares our estimate of the average relativity between North Queensland premium rates and each of Sydney/Melbourne with comparable figures in the AGA's report.

Table 4.6 – Average Relativity of North Queensland to Sydney Premiums, 2012-2013

Cover	AGA Report	Selected Rel
Buildings	2.63	3.29
Contents	2.17	1.95
Strata	5.56	5.79

Source: Australian Government Actuary's 2014 Reports

Our estimated premiums imply a slightly higher relativity to Sydney for Buildings than shown in the AGA's reports. The AGA's analysis was based on earned premiums in the 2012/13 year. Since that time the average relativity to NSW would have widened due to premium increases in North Queensland and hence we assess the outcome as reasonable.

4.5.2 Comparison to APRA Statistics

APRA publishes the Home and Contents gross earned premium collected by insurers by state in its general insurance statistics quarterly publications. We have estimated the non-cyclone part of these premiums (based on an average rate per sum insured applied to the sums insured in each state). This estimate of the non-cyclone premium is then deducted from the APRA premiums, with the balance being an estimate of the cyclone premiums included in the APRA figures. The APRA cyclone premium is then compared to our modelled premium as a check of reasonableness, as per Table 4.7.

Table 4.7 – Comparison with APRA GI Statistics

	QLD	WA	NT
APRA Premium ($m)	1,892	776	60
Estimated Non Cyclone Premium	1,380	690	45
Estimated Cyclone Premium	512	86	15
Modelled Cyclone Premium ($m)	523	86	20
Difference ($m)	10.3	0.3	5.1
Difference (%)	-2%	0%	-26%

Source: APRA Statistics – Quarterly General Insurance Performance June 2015.

The above comparison shows that our cyclone premium pool by state is close to our estimate of the cyclone pool implied by the premium figures published by APRA. Whilst this reasonableness test is approximate, there is nothing from it to suggest that our cyclone premium pool is unreasonable.

4.6 Key Uncertainties

It is important to recognise the following key uncertainties in interpreting our estimates of the size of the pool:

- We know less about the exposure than the information that would be available to insurers at the time of pricing, especially for Strata.
- The premium algorithm that we have used for Strata is based mostly on views of interested parties (such as brokers), with only limited actual premium data available.
- The insurer prices available online for Home and Contents are not the same as the premiums being paid by consumers (for reasons set out in Table 4.1). Whilst we have attempted to adjust for known differences, this process involved estimation.

5 Assumptions for Modelling

This section sets out the assumptions we have used for the modelling of each option. The following two sections show the modelling results for each of the direct insurer and reinsurer options.

5.1 Expenses

The expenses of the scheme would include:

- **The costs paid to the direct insurers to manage claims**

  Based on benchmarks derived from our work with insurers regarding claims handling costs for catastrophe claims we assess these costs could be around 5% of the amount of claims paid.

- **The operating expenses of the government entity**

  These would be reasonably modest in the context of the total cost of the scheme, noting that most of the management of individual claims and the processing of individual policies would be undertaken by insurers. The scheme entity would likely undertake activities such as audits of insurer practices, pricing studies and mitigation research that may have a reasonable cost. There would also be engagement with community, especially for the direct insurer option. We estimate these expenses would be around $15 million per annum for the reinsurer scheme, and $25 million per annum for the direct insurer scheme given the greater community role that would be likely. By way of a benchmark, we note that the expenses of the government pool for terrorism claims (Australian Reinsurance Pool Corporation) are around $7 million per annum.

- **The agency costs paid to the insurers (for the government insurer option only)**

  The insurer would pay commission to the private insurers for acting as agents in respect of the cyclone policy. We estimate these costs might be around 5%-10% of premiums and have assumed a rate of 7%. This rate is lower than normal agency costs and reflects our assumption that no acquisition costs would be allocated to the cyclone product by insurers, given that the price would be the same regardless of which insurer the consumer selects. This also assumes that commission would not be paid on the cyclone premium for business written by an intermediary, again noting that the cyclone component is fixed and would not need to be brokered. We note that there will be set-up costs for insurers (which would cost more than 7% of the first year's premium), but the ongoing costs would probably be less than this amount.

5.2 Claims Costs

The Taskforce provided us with the expected distribution of cyclone claims costs. The Taskforce's assessment brought together work they commissioned from a number of firms with expertise in catastrophe modelling. The various model outputs were blended, noting that there is no single correct model. The modelling made allowance for:

- post event demand surge, whereby claims costs can increase beyond expected levels following a large event
- coverage in line with the costs to be met by the Scheme, including riverine flood and storm surge claims costs

The claims costs did not make explicit allowance for loss adjustment expenses. These expenses, which average around 5% of the amounts paid to repair the property, are typically considered to be part of the

cost of claims (and not part of management expenses). Hence we have increased the modelled costs by 5% to include this component.

Table 5.1 summarises the average annual losses (AALs) implied by the catastrophe models.

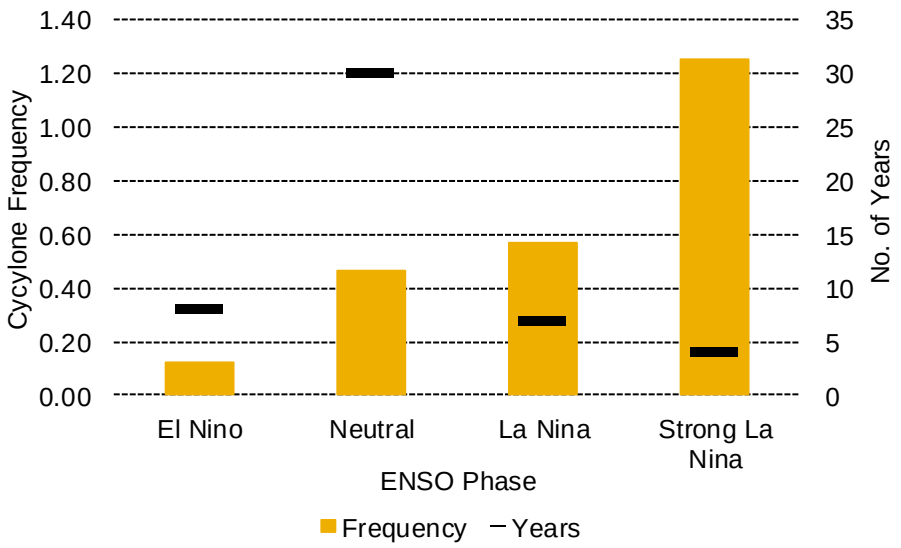
Table 5.1– Summary of Modelled Claims Costs

	Class			
Region	Home	Contents	Strata	Total
	$m	$m	$m	$m
Northern Australia	235	29	21	285
Other	177	21	11	209
National Total	**412**	**50**	**32**	**494**

The model data provided by the Taskforce indicates an average annual cost of $285 million for Northern Australia, relating to an average of 2.3 cyclones per annum with a cost of above $1 million. The worst 1 in 200 year cost is estimated to be $5 billion.

In applying the model results we have made allowance for the skewness in outcomes that flow from El Nino Southern Oscillation (ENSO). Specifically in La Nina years, and Strong La Nina years in particular, the sea surface temperatures to the north east of Australia are warmer than average, leading to a higher frequency of cyclones. Conversely in El Nino years the water temperatures are lower and the cyclone frequency is lower also. Using the ICA Disaster Catastrophe List and ENSO information from the Bureau of Meteorology, Figure 5.1 below shows the cyclone frequency in Australia over the last 50 year period by classifying each year into its ENSO phase.

Figure 5.1 – Cyclone Frequency by ENSO Phase



This shows that the ENSO phases have high correlation to the frequency of cyclone occurrence in Australia, and in particular Strong La Nina years tend to generate much higher cyclone frequencies.

On this basis, we have made assumptions about cyclone frequency on the east coast are that reflects this historical experience:

- El Nino episodes (25% of years) – frequency 50% below average
- Neutral episodes (50% of years) – frequency 20% below average
- Moderate La Nina episodes (15% of years) – frequency 50% above average
- Strong La Nina episodes (10% of years) – frequency 150% above average.

The use of these assumptions adds extra skewness to the outcomes by year, which manifest as a "clustering" of events in certain strong La Nina years.

5.3 Reinsurance Arrangements and Cost

The fully funded option includes the purchase of external reinsurance. The reinsurance assumptions we have used are set out below.

5.3.1 Insurer Retentions (Reinsurance Pool Option)

The reinsurance retentions were set having regard to the following two objectives:

1. Limiting the premiums the direct insurers would need to collect for their net retained claims costs. If the retentions are too high, the direct insurer premiums will remain high, impacting affordability.
2. Limiting the number of cyclone events that would involve the government reinsurer

Based on past discussions with reinsurance brokers we understand that the aggregate net retention of insurers for catastrophe events is around $1 billion. In order to satisfy the first objective we need to target a materially lower industry retention – say something in the range $100 million to $300 million.

The modelling work provided by the Taskforce suggests that for a $100 million retention:

- the costs retained by insurers under a Northern Australia scheme would be an AAL of around $70 million, or 25% of the modelled cyclone claims costs – this is already a significant cost
- there will be an average of two claims every three years on the scheme. This is probably more frequent than would be ideal, but we note that the frequency only reduces slightly if the retention is increased to $200 million

Thus, we have used a $100 million retention across all insurers. On this basis the expected average annual cyclone costs of $285 million would be split between the direct insurers and reinsurers as follows:

- Direct insurers: $70 million
- Reinsurer: $215 million

5.3.2 Scheme Retention

The outwards reinsurance is assumed to attach at $200 million, which would have reasonable acceptance in the current reinsurance market (albeit at the low end of the range for a programme of this size). It would be very difficult to purchase cover at lower retentions.

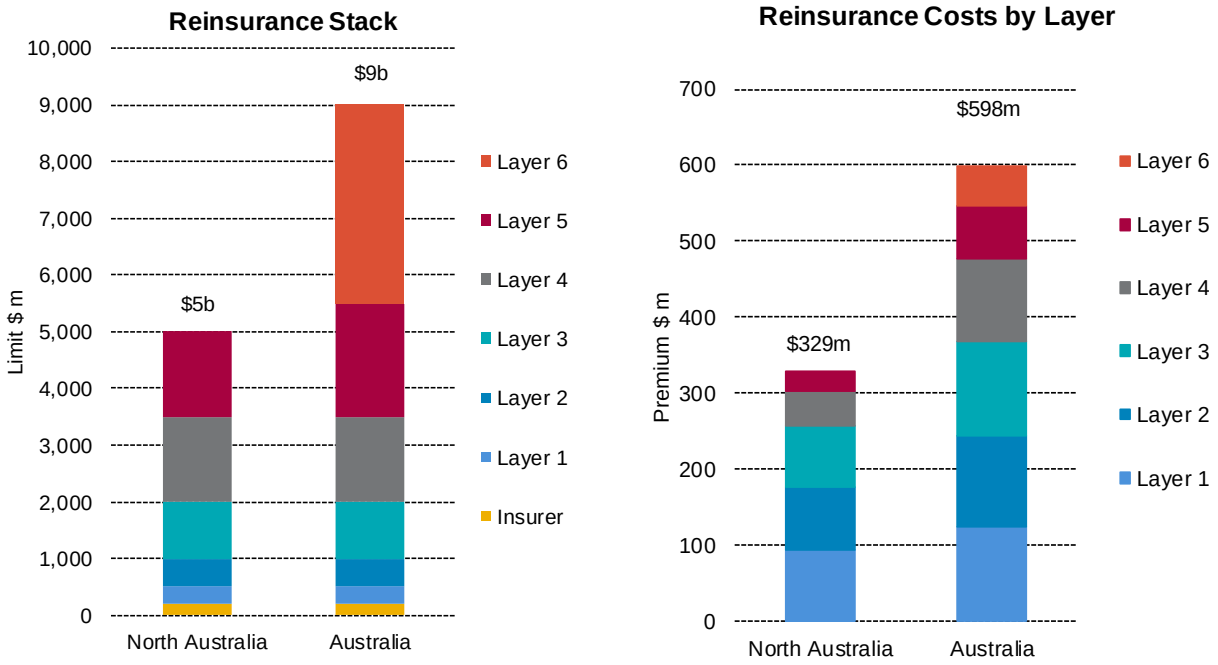
5.3.3 Size of Programme

The programme would be purchased to provide cover against a 1 in 200 year event. This is consistent with the approach adopted by much of the general insurance market.

5.3.4 Structure of Programme

Figure 5.2 shows the assumed programme for the National and Northern Australia schemes.

Figure 5.2 – Assumed Programme and Cost



Based on input from Guy Carpenter and discussions we held with reinsurers we estimate the cost of the reinsurance would currently be about $330 million for Northern Australia and $600 million for the National scheme. The implied loss ratio relative to the modelled costs is around 55%. This represents good value in the context of reinsurance pricing and is reflective of a current soft market. We understand that rates could be as much as 50% higher in a hard market.

From discussions with reinsurers and a reinsurance broker we understand the Northern Australia option ($5 billion limit) would be easy to place. The National option ($9 billion limit) would be harder to place and would probably need a retention of $300 million to $500 million. For comparability, though, we have modelled the National option with a $200 million retention.

The reinsurance would have a “pre-paid reinstatement”. This means that two major events would be covered. In extreme circumstances:

- For a massive event the limit of the reinsurance may not be enough and the government guarantee would be called on
- For multiple large events there might be a need to go out mid-year and buy some more reinsurance

The most important risk for the scheme is coping with a bad cyclone year (or two or three) where costs add up from the first $200m for each event. This would require capital injections from government.

5.3.5 Impact on Reinsurance Premiums Paid by Direct Insurers

It is likely that the cost of insurers' existing reinsurance programmes will not reduce by as much as the cost of the scheme's reinsurance programme – i.e. overall the amounts being collected by reinsurers for the cyclone risk will increase. There are three reasons for this:

- The size of the insurers programmes will be similar, noting that the size of programmes tends to be driven by earthquake
- The reinsurance costs includes both a claims component, and a component for access to the reinsurers' capital
- More of the overall cyclone risk will be carried by reinsurers.

In our view this extra reinsurance cost will not impact on cyclone areas. The extra cost will make the programmes that insurers are buying for other perils more expensive relative to premiums, and the cost will be borne by the risks exposed to those other perils.

This may mean a cost of up to $200 million being added to non-cyclone areas, which represents around 2% of the total premium pool in Australia.

5.4 Capital Requirements for Fully Funded Option

The Fully Funded option requires the entity to have commercial levels of capital. Insurers hold capital such that they are able to meet their obligations to policyholders in an adverse year. We have used the APRA capital basis to assess the capital levels, plus a buffer of 50%. This is broadly in line with insurer practices. Table 5.2 sets out the initial capital required under each option.

Table 5.2 – Calculation of Initial Capital

	Insurer		Reinsurer	
Component	North Australia	National	North Australia	National
	$m	$m	$m	$m
Premium Liability Risk Charge	60	30	40	70
Insurance Concentration Risk Charge	550	570	270	280
Asset Risk Charge	30	30	10	20
Operational Risk Charge	30	20	10	10
Less Aggregation Benefit	-20	-20	-10	-10
Prescribed Capital Amount	**640**	**630**	**320**	**370**
Capital Buffer	320	310	160	180
Capital	**960**	**940**	**480**	**550**

The key driver of the APRA capital for an entity such as this is the Insurance Concentration Risk Charge, which relates to multiple events occurring in a year, noting that reinsurance is purchased to protect against an individual large event. The capital would also be impacted by asset risk charges on recoveries due from reinsurers following an event.

We have assumed that the capital buffer can fall to 20% before an injection is needed. We have not placed a maximum on the buffer, with the consequences being that after a number of favourable years the buffer will increase.

Given the limited diversification and nature of risk, the capital levels are significant, representing in excess of one year's premium.

The premiums would need to fund the cost of this capital so that capital grows at the rate of scheme growth (around 5% pa).

5.5 First Loss Assumptions

The modelling provided to us by the Taskforce shows the following average reductions in claims cost for Northern Australia at varying first loss thresholds.

Table 5.3 – First Loss Assumptions

First Loss	Reduction in Cost on Average
$5,000	15%
$10,000	24%
$30,000	47%

The reductions in cost would be less for the more severe events. So for severe events in particular the private insurers would be left with significant cost – in effect this option leaves the private insurers with relatively more of the tail risk.

The lower thresholds of $5,000 and $10,000 are too low to deliver large savings to consumers. Hence they have not been modelled.

6 Direct Insurer Options

This section sets out our assessment of the direct insurer options, including quantification of the benefit to consumers and the costs to government.

6.1 Key Metrics

The key metrics that have been used to summarise each scheme are:

(a) The estimated reduction in cyclone premiums

(b) The expected average annual cost to government

(c) The probability that the aggregate government funding will exceed various levels ($1 billion, $2 billion and $5 billion) for each of three time periods (one year, four years and 10 years). Additionally, for the second 10 year option shown, we allow for any funds remaining in the scheme to be returned to government at the end of the 10 years.

6.2 Reduction in Consumer Premiums

Table 6.1 shows the calculation of the cyclone premium that would be paid by consumers for the national direct insurer scheme for each scheme scenario.

Table 6.1 – Premium Reduction by Scenario – National Direct Insurer Scheme

	Unfunded	Partially Funded	30% Discount	Fully Funded
	$m	$m	$m	$m
Gross Claims Cost	-	494	N/A	494
Less Reinsurance	-	-	N/A	320
Net Claims Cost	-	494	N/A	174
Reinsurance Premium	-	-	N/A	598
Mutual Expenses	25	25	N/A	25
Agency Costs	42	42	N/A	42
Claims Handling Costs	25	25	N/A	25
Cost of capital	-	-	N/A	52
Scheme Premium	92	586	262	916
Insurer Claims Costs	-	-	-	-
Insurer Premium	-	-	-	-
Consumer Cyclone Premium	92	586	262	916
Consumer Total Premium	7,322	7,816	7,492	8,146
Current Cyclone Premium	697	697	697	697
Current Total Premium	7,927	7,927	7,927	7,927
Cyclone Prem Discount	87%	16%	62%	-31%
Total Prem Discount	8%	1%	5%	-3%

The reductions in consumer cyclone premiums vary from 87% in a National Unfunded scheme to 16% if Partially Funded. We estimate that the Fully Funded option would require a 31% increase in cyclone premiums paid by consumers.

The Unfunded option delivers the greatest reduction in premiums, since the 'premium' collected only meets the operating costs of the scheme.

The 30% Discount option delivers the next greatest reduction in the cyclone component of consumer premiums at 62%. The scheme premium collected under this option ($262 million) is much less than the modelled gross claims cost ($494 million).

The Partially Funded option collects sufficient premiums to cover expected losses and expenses and is able to deliver a reduction in the cyclone component of consumer premiums of 16%.

Table 6.2 shows the corresponding results for the scheme limited to Northern Australia.

Table 6.2 – Premium Reduction by Scenario – Northern Australia Direct Insurer Scheme

	Unfunded	Partially Funded	30% Discount	Fully Funded
	$m	$m	$m	$m
Gross Claims Cost	-	285	N/A	285
Less Reinsurance	-	-	N/A	161
Net Claims Cost	-	285	N/A	124
Reinsurance Premium	-	-	N/A	329
Mutual Expenses	25	25	N/A	25
Agency Costs	42	42	N/A	42
Claims Handling Costs	14	14	N/A	14
Cost of capital	-	-	N/A	30
Scheme Premium	81	366	181	565
Insurer Claims Costs	-	-	-	-
Insurer Premium	-	-	-	-
Consumer Cyclone Premium	81	366	181	565
Consumer Total Premium	600	885	700	1,084
Current Cyclone Premium	481	481	481	481
Current Total Premium	1,000	1,000	1,000	1,000
Cyclone Prem Discount	83%	24%	62%	-18%
Total Prem Discount	40%	11%	30%	-8%

For a Northern Australia direct insurer, the reductions in consumer premiums for cyclone cover vary from 83% under the Unfunded option to an increase in premiums of 18% under the Fully Funded option.

The results in this table indicate that for significant reductions in consumer premiums to be achieved it is necessary to use the government balance sheet in place of the purchase of reinsurance. Savings can

also be found in removing the other margins and loadings of a commercial insurer (for example, an adequate return on capital).

Considering the Partially Funded option, the Northern Australia scheme delivers a greater level of savings to consumers compared to the Australia wide scheme.

6.3 Government Funding

Table 6.3 shows the chosen metrics for each of the national schemes.

Table 6.3 – Government Funding – National Direct Insurer Scheme

	Unfunded	Partially Funded	30% Discount	Fully Funded
Expected Capital Injeciton, averaged over long run ($m, p.a)	499	240	401	83
For the first year:				
Probability of capital injection				
>$0bn	62%	19%	33%	20%
>$1bn	11%	6%	9%	1%
>$2bn	5%	3%	5%	0%
>$5bn	2%	1%	2%	0%
Over four years				
Probability of total capital injections				
>$0bn	96%	40%	67%	35%
>$1bn	48%	20%	37%	4%
>$2bn	28%	12%	23%	2%
>$5bn	11%	5%	9%	1%
Over ten years				
Probability of total capital injections				
>$0bn	100%	56%	86%	48%
>$1bn	92%	37%	71%	10%
>$2bn	77%	27%	57%	6%
>$5bn	41%	13%	31%	3%
Over ten years				
Probability of total capital injections less capital at end				
<=$0bn (ie. in the black)	0%	65%	30%	95%
>$0bn	100%	35%	70%	5%
>$1bn	91%	29%	56%	4%
>$2bn	76%	24%	46%	3%
>$5bn	41%	15%	25%	2%

Scheme designs 1-3 involve significant government involvement. After the Unfunded option, which relies in its entirety on government capital injections, the 30% Discount option requires the next greatest level of government funding, both with respect to the frequency and amount of capital required.

In the first year of the scheme there is a low probability that the government guarantee will exceed $5 billion (range of 0% to 2%). Over the life of the scheme, however, there is a greater chance that total government contributions will exceed $5 billion (3% to 41% across 10 years).

Considering that in some years no cyclones occur and the premium collected accumulates there is a chance that the government cost could be nil (except for Unfunded). Under the Partially Funded option, there is a 65% chance that the net assets at year 10 equal or exceed the total capital injections made over the life of the scheme. For the Fully Funded scheme there is a 95% chance of this occurring, while for the 30% Discount scheme the chance is only 30%.

Table 6.4 shows the metrics for each of the northern Australia schemes.

Table 6.4 – Government Funding – Northern Australia Insurer Scheme

	Unfunded	Partially Funded	30% Discount	Fully Funded
Expected Capital Injeciton, averaged over long run ($m, p.a)	285	134	227	57
For the first year:				
Probability of capital injection				
>$0bn	63%	20%	34%	27%
>$1bn	7%	4%	6%	1%
>$2bn	3%	1%	3%	0%
>$5bn	1%	0%	1%	0%
Over four years				
Probability of total capital injections				
>$0bn	96%	42%	68%	41%
>$1bn	35%	14%	27%	3%
>$2bn	17%	7%	14%	1%
>$5bn	5%	2%	4%	1%
Over ten years				
Probability of total capital injections				
>$0bn	100%	59%	88%	56%
>$1bn	83%	30%	63%	8%
>$2bn	59%	18%	43%	4%
>$5bn	22%	6%	16%	2%
Over ten years				
Probability of total capital injections less capital at end				
<=$0bn (ie. in the black)	0%	64%	28%	96%
>$0bn	100%	36%	72%	4%
>$1bn	83%	24%	50%	3%
>$2bn	59%	16%	36%	2%
>$5bn	22%	6%	14%	1%

The Australian and Northern Australia schemes have similar likelihoods of requiring government capital injections across all four options.

For Northern Australia, the long run annual level of government funding is significantly less than for the national, i.e. $227 million versus $401 million for the 30% Discount scheme.

7 Reinsurer Options

This section sets out our assessment of the reinsurer options, including quantification of the benefit to consumers and the costs to government.

7.1 Reduction in Consumer Premiums

Table 7.1 shows the calculation of the reduction in consumer premiums for the national reinsurer scheme for each scheme scenario.

Table 7.1 – Reduction in Premium by Scenario – National Reinsurer Scheme - Excess of Loss

	Unfunded	Partially Funded	30% Discount	Fully Funded
	$m	$m	$m	$m
Gross Claims Cost	-	406	N/A	406
Less Reinsurance	-	-	N/A	320
Net Claims Cost	-	406	N/A	86
Reinsurance Premium	-	-	N/A	598
Mutual Expenses	15	15	N/A	15
Agency Costs	-	-	N/A	-
Claims Handling Costs	-	-	N/A	-
Cost of capital	-	-	N/A	48
Scheme Premium	15	421	90	747
Insurer Claims Costs	88	88	88	88
Insurer Premium	172	172	172	172
Consumer Cyclone Premium	187	593	262	919
Consumer Total Premium	7,417	7,823	7,492	8,149
Current Cyclone Premium	697	697	697	697
Current Total Premium	7,927	7,927	7,927	7,927
Cyclone Prem Discount	73%	15%	62%	-32%
Total Prem Discount	6%	1%	5%	-3%

Similar to the Direct Insurer model, the Fully Funded option is again more expensive than current cyclone premiums, reflecting both the costs of reinsurance and retained claims cost of commercial insurers.

The reductions in consumer premiums vary from 73% under the Unfunded option to an increase of 32% under Fully Funded option for cyclone risk.

Table 7.2 shows the corresponding results for the scheme limited to Northern Australia.

Table 7.2 – Reduction in Premium by Scenario – Northern Australia Reinsurer Scheme

	Unfunded	Partially Funded	30% Discount	Fully Funded
	$m	$m	$m	$m
Gross Claims Cost	-	213	N/A	213
Less Reinsurance	-	-	N/A	161
Net Claims Cost	-	213	N/A	52
Reinsurance Premium	-	-	N/A	329
Mutual Expenses	15	15	N/A	15
Agency Costs	-	-	N/A	-
Claims Handling Costs	-	-	N/A	-
Cost of capital	-	-	N/A	27
Scheme Premium	15	228	46	423
Insurer Claims Costs	72	72	72	72
Insurer Premium	135	135	135	135
Consumer Cyclone Premium	150	363	181	558
Consumer Total Premium	669	882	700	1,077
Current Cyclone Premium	481	481	481	481
Current Total Premium	1,000	1,000	1,000	1,000
Cyclone Prem Discount	69%	25%	62%	-16%
Total Prem Discount	33%	12%	30%	-8%

In this case the reductions in consumer cyclone premiums vary from 69% under the Unfunded option to an increase of 16% under Fully Funded option. Compared to the National scheme, the Northern Australia scheme delivers greater premium reductions for consumers under the Partially Funded and Fully Funded options.

Table 7.3 shows the corresponding results for the First Loss scheme with a cap of $30,000 per claim limited to Northern Australia.

Table 7.3 – Reduction in Premium by Scenario – Northern Australia First Loss Scheme

	Unfunded	Partially Funded	30% Discount
	$m	$m	$m
Gross Claims Cost	-	127	N/A
Less Reinsurance	-	-	N/A
Net Claims Cost	-	127	N/A
Reinsurance Premium	-	-	N/A
Mutual Expenses	15	15	N/A
Agency Costs	-	-	N/A
Claims Handling Costs	-	-	N/A
Cost of capital	-	-	N/A
Scheme Premium	15	142	- 97
Insurer Claims Costs	158	158	158
Insurer Premium	278	278	278
Consumer Cyclone Premium	293	421	181
Consumer Total Premium	812	939	700
Current Cyclone Premium	481	481	481
Current Total Premium	1,000	1,000	1,000
Cyclone Prem Discount	39%	13%	62%
Total Prem Discount	19%	6%	30%

The First Loss option delivers a lower level of savings than seen in Table 7.2 under an excess of loss reinsurance option. This is because a greater portion of the claims cost is left with commercial insurers.

Under the 30% Discount option consumer premiums would not be sufficient to carry the cost borne by insurers and a direct government subsidy of $97 million would need to be paid to insurers.

7.3 Government Funding

Table 7.4 shows the metrics for each of the national schemes.

Table 7.4 – Government Funding by Scenario – National Reinsurer Scheme

	Unfunded	Partially Funded	30% Discount	Fully Funded
Expected Capital Injeciton, averaged over long run ($m, p.a)	404	213	378	46
For the first year:				
Probability of capital injection				
>$0bn	53%	17%	31%	8%
>$1bn	9%	5%	8%	0%
>$2bn	5%	3%	5%	0%
>$5bn	2%	1%	2%	0%
Over four years				
Probability of total capital injections				
>$0bn	95%	37%	69%	16%
>$1bn	38%	18%	34%	2%
>$2bn	23%	11%	21%	2%
>$5bn	9%	4%	8%	1%
Over ten years				
Probability of total capital injections				
>$0bn	100%	53%	90%	23%
>$1bn	80%	34%	72%	5%
>$2bn	63%	25%	56%	4%
>$5bn	33%	12%	30%	3%
Over ten years				
Probability of total capital injections less capital at end				
<=$0bn (ie. in the black)	0%	66%	20%	96%
>$0bn	100%	34%	80%	4%
>$1bn	80%	28%	62%	3%
>$2bn	63%	23%	49%	3%
>$5bn	33%	14%	27%	2%

Compared to the Direct Insurer model, the Reinsurer model has a lower likelihood of government capital injections for the Unfunded, Partially Funded and Fully Funded models. This reflects the impact of the commercial insurers' retained cost per event. The 30% Discount option actually has a higher likelihood of requiring a capital injection due to the fact that under the Reinsurer model the scheme collects even less premium (see Table 6.1 and Table 7.1). The consumer premium after the 62% reduction (to achieve a total reduction in premiums of 30%) is now apportioned between the commercial insurers and the scheme in Table 7.1.

Table 7.5 shows the metrics for each of the Northern Australia schemes.

Table 7.5 – Government Funding by Scenario – Northern Australia Reinsurer Scheme

	Reinsurer				First Loss $30,000		
	Unfunded	Partially Funded	30% Discount	Fully Funded	Unfunded	Partially Funded	30% Discount
Expected Capital Injeciton, averaged over long run ($m, p.a)	209	112	199	23	98	50	195
For the first year:							
Probability of capital injection							
>$0bn	47%	17%	28%	18%	47%	15%	100%
>$1bn	5%	3%	5%	0%	2%	1%	3%
>$2bn	2%	1%	2%	0%	1%	0%	1%
>$5bn	1%	0%	1%	0%	0%	0%	0%
Over four years							
Probability of total capital injections							
>$0bn	92%	37%	67%	26%	92%	32%	100%
>$1bn	25%	12%	23%	2%	12%	5%	21%
>$2bn	13%	6%	13%	1%	5%	2%	6%
>$5bn	4%	1%	3%	1%	1%	0%	1%
Over ten years							
Probability of total capital injections							
>$0bn	100%	54%	90%	34%	100%	47%	100%
>$1bn	64%	27%	60%	4%	41%	13%	100%
>$2bn	43%	16%	40%	3%	19%	6%	48%
>$5bn	15%	5%	14%	2%	3%	0%	7%
Over ten years							
Probability of total capital injections less capital at end							
<=$0bn (ie. in the black)	0%	66%	17%	96%	0%	73%	0%
>$0bn	100%	34%	83%	4%	100%	27%	100%
>$1bn	64%	22%	53%	3%	41%	14%	100%
>$2bn	43%	15%	37%	2%	19%	8%	48%
>$5bn	15%	5%	14%	1%	3%	2%	7%

The Fully Funded option has a lower probability of requiring capital injections compared to the other options.

After the Fully Funded option (and ignoring the First Loss options for the time being), it is the Partially Funded option which records lower probabilities of capital injections at the one, four and ten year measures. It also has a 66% chance that the net assets of the scheme at its end will surpass or equal the capital injections required to be made by government.

The Partially Funded First Loss option indicates a lower likelihood still that the government will be called upon. Under this option the government's exposure is capped at a maximum of $30,000 per claimant per event.

8 Reliances and Limitations

8.1 Distribution and Use

This report is being provided for the sole use of the Department of the Treasury for the purposes stated in Section 1 of this report. It is not intended, nor necessarily suitable, for any other purpose. This report should only be relied on the purpose for which it is intended.

We understand that our involvement and report findings may be referenced in the Taskforce's own report and potentially attached to that report and publicly available. Third parties, whether authorised or not to receive this report, should recognise that the furnishing of this report is not a substitute for their own due diligence and should place no reliance on this report or the data contained herein which would result in the creation of any duty or liability by Finity to the third party.

Finity has performed the work assigned and has prepared this report in conformity with its intended utilisation by a person technically competent in the areas addressed and for the stated purposes only. Judgements about the conclusions drawn in this report should be made only after considering the report in its entirety, as the conclusions reached by a review of a section or sections on an isolated basis may be incorrect.

The report should be considered as a whole. Members of Finity staff are available to answer any queries, and the reader should seek that advice before drawing conclusions on any issue in doubt.

8.2 Reliances: Data and Other Information

We have relied on the accuracy and completeness of all data and other information (qualitative, quantitative, written and verbal) provided to us for the purpose of this report. Whilst we have not independently verified the accuracy of the information provided, we did undertake reasonableness checks. We noted some anomalies with the exposure data that was provided by the Taskforce – specifically the sums insured were overstated in some zones. With the agreement of the Taskforce we have rescaled the sums insured to Finity benchmarks. The pro-rata adjustment has also been applied to the modelled claims results so that the premiums and claims are based on like-with-like exposure assumptions. All results in our report have are shown have been applied the pro-rata adjustment.

It should be noted that if any data or other information is inaccurate or incomplete, we should be advised so that our advice can be revised, if warranted.

8.3 Limitations: Uncertainty

In our judgement, we have employed techniques and assumptions that are appropriate, and the conclusions presented herein are reasonable, given the information currently available. However, the estimation of cyclone claims costs and premiums is uncertain. It is important that our advice be considered in the context of the following uncertainties.

In particular, there are uncertainties around the measurement of actual premiums charged by insurers and reinsurers:

- There are shortcomings with the exposure data used in the analysis. Whilst this impacts the numbers shown in this report in absolute terms, we believe the findings regarding the relative position of the current arrangements versus the scheme are reasonable.

- We have estimated the current premiums using online insurer prices, benchmarks, and discussions with brokers. While the estimates will differ to actual premiums, we believe they are sufficiently reliable having regard to the purposes of the study.
- It was necessary to estimate the costs of the scheme purchasing reinsurance. Whilst our assumptions followed discussions with reinsurers and a reinsurance broker, the cost of reinsurance is inevitably a negotiation and it is possible that the costs could be higher or lower in practice. We have shown the impact of the reinsurance costs being higher.

There are also uncertainties relating to determine the cost of cyclones:

- The occurrence, cost of cyclones, and location of damage of a particular cyclone in Australia is difficult to determine and varies under different climate conditions. The frequency of cyclone occurring in Australia is a rare event and there is inherent difficulties to form a certain view on future cost outcomes. We have relied on the modelling results provided by the Taskforce. However the actual cyclone cost in the future will differ significantly from the modelled results, both in any one year and over a period of years.

Part III Appendices

A Data

We were provided with the following information for our review:

- Exposure file prepared by Combus *(NAIPT_Task1_A.csv)*
- Modelled Cyclone Costs *(Final output v2.xlsx)*

A.1 Exposure File

Description of File

A dataset by SA1 detailing the number, construction type and age of buildings, as well as the policy type (Home, Contents, Strata) and average property value, sum insured and policy deductible.

Data Issues

We checked the exposure file for overall reasonableness and found that sums insured by Cresta zone appeared quite high in cyclone prone areas relative to benchmarks from our perils pricing models (finperils) and also relative to the non-cyclone prone areas from the same exposure file. This issue was observed in both domestic buildings and contents sums insured.

Considering only the exposure file, in some cases the average buildings sum insured for cyclone prone areas was more than 2 times the average Sydney sum insured.

Having considered this issue we have agreed with the Taskforce to rescale the sum insureds to Finity benchmarks with a pro-rata adjustment in the results shown in this report. The pro-rata adjustments are shown in the table below.

Table A.1 – Exposure Sum Insured Pro-Rata Adjustments

	Buildings	Contents	Total (Excl Strata Buildings)
North Aus	-18%	-59%	-28%
Outside North Aus	0%	-42%	-11%
Total	**-13%**	**-55%**	**-23%**

A.2 Modelled Cyclone Costs

Description of File

Treasury contracted four separate catastrophe modellers to prepare distributions of the frequency and severity of cyclones for Northern Australia and Australia. The catastrophe modellers were provided with the same exposure file. Treasury, through the Australian Government Actuary, then made some adjustments to outliers in these estimates and developed an approach to aggregate the four estimates into a single distribution.

Specifically provided in the file was:

- The Annual Aggregate Loss by Cresta zone and by class of business
- Probable Maximum Losses at different return periods by class of business and region
- The annual frequency of cyclones and the average size per event, including a distribution of this average event size by class of business and region.

B Recent Cyclone Claims Costs

This appendix supports Section 3 and provides more detail of our assessment of cyclone claims costs over the last 20 years.

Table B.1 – List of Recent Cyclones in Australia not in ICA Catastrophe List

Cyclone	Year	Cyclone costs All classes ($m)	Percentage excluded	Category of cyclone strength at time of landfall
Warren	1995	1	0%	2
Chloe	1995	1	30%	4
Gertie	1995	1	30%	3
Barry	1996	1	0%	3
Jacob	1996	1	30%	1
Kirsty	1996	1	30%	4
Ethel	1996	1	0%	2
Nicholas	1996	1	70%	1
Phil	1996	1	0%	1
Rachel	1997	22	30%	3
Sid	1997	360	90%	1
Tiffany	1998	1	70%	0
May	1998	2	0%	1
Thelma	1998	1	0%	3
Gwenda	1999	1	70%	2
Ilsa	1999	1	0%	1
John	1999	10	0%	4
Norman	2000	1	70%	0
Rosita	2000	10	0%	4
Sam	2000	1	0%	4
Anthony	2001	1	0%	2
Terri	2001	1	0%	2
Winsome	2001	10	70%	2
Wylva	2001	49	90%	1
Abigail	2001	49	90%	2
Chris	2002	1	0%	5
Graham	2003	1	0%	2
Craig	2003	1	0%	2
Debbie	2003	1	0%	2
Fritz	2004	1	70%	0
Monty	2004	1	0%	3
Evan	2004	1	70%	1
Fay	2004	1	0%	4
Raymond	2004	1	0%	1
Harvey	2005	1	0%	3
Ingrid	2005	52	30%	3
Clare	2006	1	0%	3
Daryl	2006	1	30%	1
Emma	2006	1	0%	1
Glenda	2006	3	0%	0
Hubert	2006	1	70%	1
Monica	2006	34	30%	3
Nelson	2007	1	0%	2
Helen	2007	6	0%	2
Nicholas	2008	39	70%	1
Billy	2008	1	0%	2
Dominic	2009	1	0%	2
Ellie	2009	1	0%	1
Laurence	2009	10	30%	2
Magda	2010	1	70%	2
Olga	2010	1	70%	0
Ului	2010	10	0%	2
Paul	2010	10	70%	1
Bianca	2011	1	70%	0
Carlos	2011	23	30%	0
Grant	2011	1	70%	2
Heidi	2012	1	0%	3
Lua	2012	1	0%	4
Rusty	2013	1	0%	3
Alessia	2013	1	30%	1
Christine	2013	1	0%	3
Dylan	2014	1	70%	2
Fletcher	2014	1	90%	0
Gillian	2014	1	0%	0
Lam	2015	82	0%	4
Olwyn	2015	100	30%	3
Nathan	2015	30	30%	4

Table B.2 – List of Recent Cyclone Costs in Australia

		Australia wide costs ($m)			Northern Australia only costs ($m)			% Excluded
Cyclone	Year	Home	Contents	Strata	Home	Contents	Strata	All Classes
Bobby	1995	20.91	4.00	1.79	18.82	3.60	1.61	30%
Warren	1995	0.47	0.09	0.04	0.47	0.09	0.04	0%
Chloe	1995	0.33	0.06	0.03	0.33	0.06	0.03	30%
Gertie	1995	0.33	0.06	0.03	0.33	0.06	0.03	30%
Barry	1996	0.47	0.09	0.04	0.47	0.09	0.04	0%
Jacob	1996	0.33	0.06	0.03	0.33	0.06	0.03	30%
Kirsty	1996	0.33	0.06	0.03	0.33	0.06	0.03	30%
Ethel	1996	0.47	0.09	0.04	0.47	0.09	0.04	0%
Olivia	1996	3.73	0.72	0.32	3.73	0.72	0.32	0%
Nicholas	1996	0.14	0.03	0.01	0.14	0.03	0.01	70%
Phil	1996	0.47	0.09	0.04	0.47	0.09	0.04	0%
Sid	1997	16.83	3.22	1.44	16.83	3.22	1.44	90%
Justin	1997	11.76	2.25	1.00	11.76	2.25	1.00	30%
Rachel	1997	7.10	1.36	0.61	7.10	1.36	0.61	30%
Tiffany	1998	0.14	0.03	0.01	0.14	0.03	0.01	70%
Les	1998	37.52	7.19	3.21	37.52	7.19	3.21	70%
May	1998	0.88	0.17	0.07	0.88	0.17	0.07	0%
Thelma	1998	0.47	0.09	0.04	0.47	0.09	0.04	0%
John	1999	4.68	0.90	0.40	4.68	0.90	0.40	0%
Rona	1999	8.71	1.67	0.74	8.71	1.67	0.74	0%
Vance	1999	67.20	12.87	5.74	60.48	11.59	5.17	0%
Gwenda	1999	0.14	0.03	0.01	0.14	0.03	0.01	70%
Ilsa	1999	0.47	0.09	0.04	0.47	0.09	0.04	0%
Steve	2000	13.50	2.59	1.15	12.15	2.33	1.04	30%
Norman	2000	0.14	0.03	0.01	0.14	0.03	0.01	70%
Rosita	2000	4.68	0.90	0.40	4.68	0.90	0.40	0%
Sam	2000	0.47	0.09	0.04	0.47	0.09	0.04	0%
Terri	2001	0.47	0.09	0.04	0.47	0.09	0.04	0%
Winsome	2001	1.40	0.27	0.12	1.40	0.27	0.12	70%
Wylva	2001	2.28	0.44	0.20	2.28	0.44	0.20	90%
Abigail	2001	2.28	0.44	0.19	2.28	0.44	0.19	90%
Anthony	2001	0.47	0.09	0.04	0.47	0.09	0.04	0%
Chris	2002	0.47	0.09	0.04	0.47	0.09	0.04	0%
Graham	2003	0.47	0.09	0.04	0.47	0.09	0.04	0%
Craig	2003	0.47	0.09	0.04	0.47	0.09	0.04	0%
Debbie	2003	0.47	0.09	0.04	0.47	0.09	0.04	0%
Fritz	2004	0.14	0.03	0.01	0.14	0.03	0.01	70%
Monty	2004	0.47	0.09	0.04	0.47	0.09	0.04	0%
Evan	2004	0.14	0.03	0.01	0.14	0.03	0.01	70%
Fay	2004	0.47	0.09	0.04	0.47	0.09	0.04	0%
Raymond	2004	0.47	0.09	0.04	0.47	0.09	0.04	0%
Harvey	2005	0.47	0.09	0.04	0.47	0.09	0.04	0%
Ingrid	2005	16.96	3.25	1.45	16.96	3.25	1.45	30%
Clare	2006	0.47	0.09	0.04	0.47	0.09	0.04	0%
Hubert	2006	0.14	0.03	0.01	0.14	0.03	0.01	70%
Daryl	2006	0.33	0.06	0.03	0.33	0.06	0.03	30%
Emma	2006	0.47	0.09	0.04	0.42	0.08	0.04	0%
Larry	2006	378.95	69.96	17.52	378.95	69.96	17.52	0%
Monica	2006	11.26	2.16	0.96	11.26	2.16	0.96	30%
Glenda	2006	1.30	0.25	0.11	1.30	0.25	0.11	0%
Helen	2007	2.74	0.52	0.23	2.74	0.52	0.23	0%
Nelson	2007	0.47	0.09	0.04	0.47	0.09	0.04	0%
George	2007	7.47	1.43	0.64	7.47	1.43	0.64	0%
Jacob	2007	0.14	0.03	0.01	0.14	0.03	0.01	70%
Nicholas	2008	5.41	1.04	0.46	5.41	1.04	0.46	70%
Billy	2008	0.47	0.09	0.04	0.47	0.09	0.04	0%
Laurence	2009	3.27	0.63	0.28	3.27	0.63	0.28	30%
Ellie	2009	0.47	0.09	0.04	0.47	0.09	0.04	0%
Charlotte	2009	4.79	0.92	0.41	4.79	0.92	0.41	30%
Dominic	2009	0.47	0.09	0.04	0.47	0.09	0.04	0%
Olga	2010	0.14	0.03	0.01	0.14	0.03	0.01	70%
Paul	2010	1.40	0.27	0.12	1.40	0.27	0.12	70%
Ului	2010	4.68	0.90	0.40	4.68	0.90	0.40	0%
Magda	2010	0.14	0.03	0.01	0.14	0.03	0.01	70%
Tasha	2010	0.69	0.13	0.06	0.69	0.13	0.06	99%
Bianca	2011	0.14	0.03	0.01	0.14	0.03	0.01	70%
Yasi	2011	959.09	176.89	43.27	959.09	176.89	43.27	0%
Grant	2011	0.14	0.03	0.01	0.14	0.03	0.01	70%
Carlos	2011	7.58	1.45	0.65	7.58	1.45	0.65	30%
Heidi	2012	0.47	0.09	0.04	0.47	0.09	0.04	0%
Lua	2012	0.47	0.09	0.04	0.42	0.08	0.04	0%
Rusty	2013	0.47	0.09	0.04	0.47	0.09	0.04	0%
Alessia	2013	0.33	0.06	0.03	0.33	0.06	0.03	30%
Christine	2013	0.47	0.09	0.04	0.42	0.08	0.04	0%
Oswald	2013	6.19	1.18	0.53	6.19	1.18	0.53	99%
Dylan	2014	0.14	0.03	0.01	0.14	0.03	0.01	70%
Fletcher	2014	0.05	0.01	0.00	0.05	0.01	0.00	90%
Gillian	2014	0.47	0.09	0.04	0.47	0.09	0.04	0%
Ita	2014	4.12	0.79	0.35	4.12	0.79	0.35	0%
Lam	2015	38.52	7.38	3.29	38.52	7.38	3.29	0%
Marcia	2015	244.04	46.74	20.85	244.04	46.74	20.85	0%
Olwyn	2015	32.73	6.27	2.80	29.45	5.64	2.52	30%
Nathan	2015	9.82	1.88	0.84	9.82	1.88	0.84	30%
Total		1,961.35	366.25	114.04	1,947.78	363.65	112.88	

C Consumer Premiums and Cost to Government

Table C.1 – Summary Premium Outcomes Across Schemes

	Current Cyclone Premium	New Cyclone Premium	% Reduction in Cyclone Premium	Current Total Premium	New Total Premium	% Reduction in Total Premium
	$m	$m		$m	$m	
Direct Insurer						
Northern Australia						
Unfunded	481	81	83%	1,000	600	40%
Partially Funded	481	366	24%	1,000	885	11%
30% Discount	481	181	62%	1,000	700	30%
Fully Funded	481	565	-18%	1,000	1,084	-8%
National						
Unfunded	697	92	87%	7,927	7,322	8%
Partially Funded	697	586	16%	7,927	7,816	1%
30% Discount	697	262	62%	7,927	7,492	5%
Fully Funded	697	916	-31%	7,927	8,146	-3%
Reinsurer						
Northern Australia						
Unfunded	481	150	69%	1,000	669	33%
Partially Funded	481	363	25%	1,000	882	12%
30% Discount	481	181	62%	1,000	700	30%
Fully Funded	481	558	-16%	1,000	1,077	-8%
National						
Unfunded	697	187	73%	7,927	7,417	6%
Partially Funded	697	593	15%	7,927	7,823	1%
30% Discount	697	262	62%	7,927	7,492	5%
Fully Funded	697	919	-32%	7,927	8,149	-3%
Northern Australia - First Loss $30,000						
Unfunded	481	293	39%	1,000	812	19%
Partially Funded	481	421	13%	1,000	939	6%
30% Discount	481	181	62%	1,000	700	30%

Table C.1 – Likelihood of Government Guarantee Across Schemes – Australia

Scheme Coverage	Australia	Australia	Australia	Australia	Australia	Australia	Australia	Australia
Scheme Model	Reinsurer	Reinsurer	Reinsurer	Reinsurer	Insurer	Insurer	Insurer	Insurer
Scheme Design	Unfunded	Partially Funded	30% Discount	Fully Funded	Unfunded	Partially Funded	30% Discount	Fully Funded
Expected Capital Injeciton, averaged over long run ($m, p.a)	404.2	213.4	378.2	46.1	499.3	240.0	400.8	83.1
For the first year								
Probability of capital injection								
>$0bn	53%	17%	31%	8%	62%	19%	33%	20%
>$1bn	9%	5%	8%	0%	11%	6%	9%	1%
>$2bn	5%	3%	5%	0%	5%	3%	5%	0%
>$5bn	2%	1%	2%	0%	2%	1%	2%	0%
Over four years								
Probability of total capital injections								
>$0bn	95%	37%	69%	16%	96%	40%	67%	35%
>$1bn	38%	18%	34%	2%	48%	20%	37%	4%
>$2bn	23%	11%	21%	2%	28%	12%	23%	2%
>$5bn	9%	4%	8%	1%	11%	5%	9%	1%
Over ten years								
Probability of total capital injections								
>$0bn	100%	53%	90%	23%	100%	56%	86%	48%
>$1bn	80%	34%	72%	5%	92%	37%	71%	10%
>$2bn	63%	25%	56%	4%	77%	27%	57%	6%
>$5bn	33%	12%	30%	3%	41%	13%	31%	3%
Over ten years								
Probability of total capital injections less capital at end								
<=$0bn (ie. in the black)	0%	66%	20%	96%	0%	65%	30%	95%
>$0bn	100%	34%	80%	4%	100%	35%	70%	5%
>$1bn	80%	28%	62%	3%	91%	29%	56%	4%
>$2bn	63%	23%	49%	3%	76%	24%	46%	3%
>$5bn	33%	14%	27%	2%	41%	15%	25%	2%

Table C.2 – Likelihood of Government Guarantee Across Schemes – North Australia

Scheme Coverage	Northern Australia	Northern Australia	Northern Australia	Northern Australia	Northern Australia	Northern Australia	Northern Australia	Northern Australia
Scheme Model	Reinsurer	Reinsurer	Reinsurer	Reinsurer	Insurer	Insurer	Insurer	Insurer
Scheme Design	Unfunded	Partially Funded	30% Discount	Fully Funded	Unfunded	Partially Funded	30% Discount	Fully Funded
Expected Capital Injeciton, averaged over long run ($m, p.a)	208.6	112.4	199.5	22.8	284.8	134.0	226.8	56.7
For the first year								
Probability of capital injection								
>$0bn	47%	17%	28%	18%	63%	20%	34%	27%
>$1bn	5%	3%	5%	0%	7%	4%	6%	1%
>$2bn	2%	1%	2%	0%	3%	1%	3%	0%
>$5bn	1%	0%	1%	0%	1%	0%	1%	0%
Over four years								
Probability of total capital injections								
>$0bn	92%	37%	67%	26%	96%	42%	68%	41%
>$1bn	25%	12%	23%	2%	35%	14%	27%	3%
>$2bn	13%	6%	13%	1%	17%	7%	14%	1%
>$5bn	4%	1%	3%	1%	5%	2%	4%	1%
Over ten years								
Probability of total capital injections								
>$0bn	100%	54%	90%	34%	100%	59%	88%	56%
>$1bn	64%	27%	60%	4%	83%	30%	63%	8%
>$2bn	43%	16%	40%	3%	59%	18%	43%	4%
>$5bn	15%	5%	14%	2%	22%	6%	16%	2%
Over ten years								
Probability of total capital injections less capital at end								
<=$0bn (ie. in the black)	0%	66%	17%	96%	0%	64%	28%	96%
>$0bn	100%	34%	83%	4%	100%	36%	72%	4%
>$1bn	64%	22%	53%	3%	83%	24%	50%	3%
>$2bn	43%	15%	37%	2%	59%	16%	36%	2%
>$5bn	15%	5%	14%	1%	22%	6%	14%	1%

Table C.3 – Likelihood of Government Guarantee for First Loss Outcomes – North Australia

Scheme Coverage Scheme Model Scheme Design	Northern Australia Reinsurer First Unfunded	Northern Australia Reinsurer First Partially Funded	Northern Australia Reinsurer First 30% Discount
Expected Capital Injeciton, averaged over long run ($m, p.a)	97.8	49.7	195.3
For the first year			
Probability of capital injection			
>$0bn	47%	15%	100%
>$1bn	2%	1%	3%
>$2bn	1%	0%	1%
>$5bn	0%	0%	0%
Over four years			
Probability of total capital injections			
>$0bn	92%	32%	100%
>$1bn	12%	5%	21%
>$2bn	5%	2%	6%
>$5bn	1%	0%	1%
Over ten years			
Probability of total capital injections			
>$0bn	100%	47%	100%
>$1bn	41%	13%	100%
>$2bn	19%	6%	48%
>$5bn	3%	0%	7%
Over ten years			
Probability of total capital injections less capital at end			
<=$0bn (ie. in the black)	0%	73%	0%
>$0bn	100%	27%	100%
>$1bn	41%	14%	100%
>$2bn	19%	8%	48%
>$5bn	3%	2%	7%

D Government Taxes and Charges

The table below shows the GST, stamp duty and fire service levy rates. All premium results in the report are shown net of taxes.

Table D.1 – Government Taxes and Charges

State	Stamp Duty	FSL	GST	**Total Taxes**
NSW	9.0%	17.0%	10.0%	**40%**
VIC	10.0%	0.0%	10.0%	**21%**
QLD	9.0%	0.0%	10.0%	**20%**
SA	11.0%	0.0%	10.0%	**22%**
WA	10.0%	0.0%	10.0%	**21%**
ACT	8.0%	0.0%	10.0%	**19%**
TAS	10.0%	0.0%	10.0%	**21%**
NT	10.0%	0.0%	10.0%	**21%**