



Terrorism Risk Insurance in Australia

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Abstract

This paper discusses terrorism risk insurance in Australia. It reviews the nature of terrorism and the risks of terrorism to the Australian community; it evaluates potential terrorism losses by comparing to natural catastrophe losses through comparing potential return periods and possible maximum losses. The paper describes how ARPC funds potential terrorism losses. Finally the paper reviews capital implications for primary insurers comparing capital if insurers reinsure with Australian Reinsurance Pool Corporation (and the Australian terrorism reinsurance scheme) versus insurers covering the risk from their own capital. The paper concludes that primary commercial property insurers may have significant terrorism exposures, and this should be considered in capital adequacy calculations if they are not reinsured with ARPC, and that some insurers face exposures in the order of \$1 billion.

Keywords: Terrorism risk insurance, terrorism, reinsurance

Introduction

In 2003 the Australian Government put in place the *Terrorism Insurance Act 2003* (the Act), and established Australian Reinsurance Pool Corporation (ARPC) to administer a scheme for terrorism reinsurance in Australia. The Act over-rides terrorism exclusions in commercial insurance policies so that cover is mandated up to policy sum insured for commercial assets when the Minister responsible for ARPC (currently the Assistant-Treasurer) declares that a terrorist incident has occurred. We call this event a declared terrorist incident or a DTI.

Whilst it is mandatory for insurance policies to payout when a DTI occurs, it is voluntary for insurers to be reinsured with ARPC. This paper provides a detailed assessment of terrorism risk insurance in Australia so that insurers can understand the risks and consequences of terrorism on insurer's capital positions.

This paper provides a wide ranging discussion on terrorism risk insurance in Australia. It will cover:

1. What is terrorism and how is the global and Australian security environment changing?
2. How does terrorism risk impact property insurers in comparison to natural catastrophes?
3. How does ARPC's reinsurance scheme fund potential terrorism losses for commercial property insurers in Australia?
4. What are the implications for Australian property insurers for terrorism risk?

We thank Geoff Atkins at Finity (ARPC's actuarial adviser) for kindly agreeing to peer review this paper and presentation. We also thank Paul Alison of Guy Carpenter (ARPC's reinsurance broker) who also provided invaluable comments on our presentation. This work is entirely our own.

About ARPC

ARPC is a Commonwealth Corporate Entity established under the *Terrorism Insurance Act 2003*. We cover over \$3 trillion aggregate exposure in private commercial sector assets. ARPC has offices in Canberra and Sydney.

ARPC has 225 insurer clients (or cedants), 57 retrocession reinsurers (or retrocessionaires), has \$130 million of annual premium income, and covers \$3.0 billion of aggregate sums insured (or exposure). The aggregate sums insured include \$2.3 trillion of buildings and contents; \$0.5 trillion of business interruption and loss of profits; and \$0.2 trillion of contract works.

Recent terrorist attacks

Since 2001 there have been significant terrorist attacks across the globe. These attacks remind us that terrorism is a global problem, with a wide variety of possible attack scenarios. Figure 1 shows images of these events. The human tragedy is real and terrible.

These attacks include:

- September 2001: The September 11 attacks.
 - al-Qaeda kill almost 3,000 people in four coordinated attacks.
- October 2002: Bali Bombings
 - Jemaah Islamiyah kill 202 people and injure 240.
- March 2004: Madrid train bombings
 - al-Qaeda kill 191 people and injure 1,800.
- July 2005: London transport system attacks
 - Terrorists attack underground trains and a bus and kill 52 people and injure 700.
- Nov 2008: Mumbai attacks
 - Lashkar-e-Taiba kill 164 people and injure 308 in 12 coordinated attacks.
- July 2011: The Norway Attacks
 - Lone wolf car bomb kills 8 people and injures 209, followed by armed assault killing 69 people and injuring 110.
- Jan 2013: Algeria gas facility attacked
 - al-Qaeda take 800 hostages, 40 people die in the rescue.
- Apr 2013: Boston marathon bomb attack
 - Chechen terrorists kill 3 people and injure 264.

- Sept 2013: Westgate shopping mall in Nairobi, Kenya.
 - al-Shabaab kill 67 people and injure over 175.

Figure 1 – Major terrorist attacks



Definition of Terrorism

Terrorism is about influencing outcomes through the use of intimidation. Terrorism is a politically and emotionally charged term. In Australia, terrorism is defined by the Australian Criminal Code Amendment (Terrorism Act 2003).

A terrorist act means an action or threat of action where there is an intention of:

- advancing a political, religious or ideological cause AND either:
- coercing, or influencing by intimidation, the government of the Commonwealth or a state, territory or foreign country, or
- intimidating the public or a section of the public.

The same act also defines what terrorism is not; it is not where:

- action is advocacy, protest, dissent or industrial action AND
- action is not intended to cause:
 - serious harm or death or to endanger life (other than that of the person taking the action);
 - serious risk to health and safety to the public

Actual Australian terrorist attacks

There have been no attacks in Australia since 1995, and this potentially creates complacency for what is a real global phenomena. But Australia has experienced several terrorist attacks historically:

- 1972 bombing of the Yugoslav General Trade Agency in Sydney.
- 1978 bombing of the Sydney Hilton hotel during CHoGM.
- 1980 assassination of the Turkish Consul-General in Sydney.
- 1982 bombing of the Israeli Consulate and the Hakoah Club in Sydney.
- 1986 bombing at the Turkish Consulate in Melbourne.
- 1995 bombing of the French Consulate in Perth.

Foiled Australian terrorism incidents

However in the last ten years there have been several foiled plots which could have resulted in losses:

- 2003, "Faheem Khalid Lodhi" plot to bomb the national electricity grid.
- 2005, "Sydney Five" planning an act of terrorism with explosives and guns.
- 2008, "Benbrika Group" - plan to bomb the 2005 AFL Grand Final, 2006 Australian Grand Prix and the Crown Casino, as well as a plot to assassinate the then Prime Minister.
- 2009, Holsworthy Barracks terror plot - plan to storm the barracks with automatic weapons.
- 2014, Sydney terror arrests.

Terrorism in the media

The Australian media this year has presented a significant number of terrorism related stories driven by change in Australia's threat level as well as intervention by security agencies to foil possible attacks.

Figure 2 – Australian media



Terrorism is a man-made catastrophe

A terrorist attack is a catastrophe, but it has different attributes to a natural catastrophe as an insured peril. These points were presented by Torsten Kraus, Munich Re, 2010, Topic Network Team for Terrorism Risk, "Terrorism Risk, Munich Re's Approach", presentation to OECD Conference on Terrorism Risk Insurance.

The different risk attributes include:

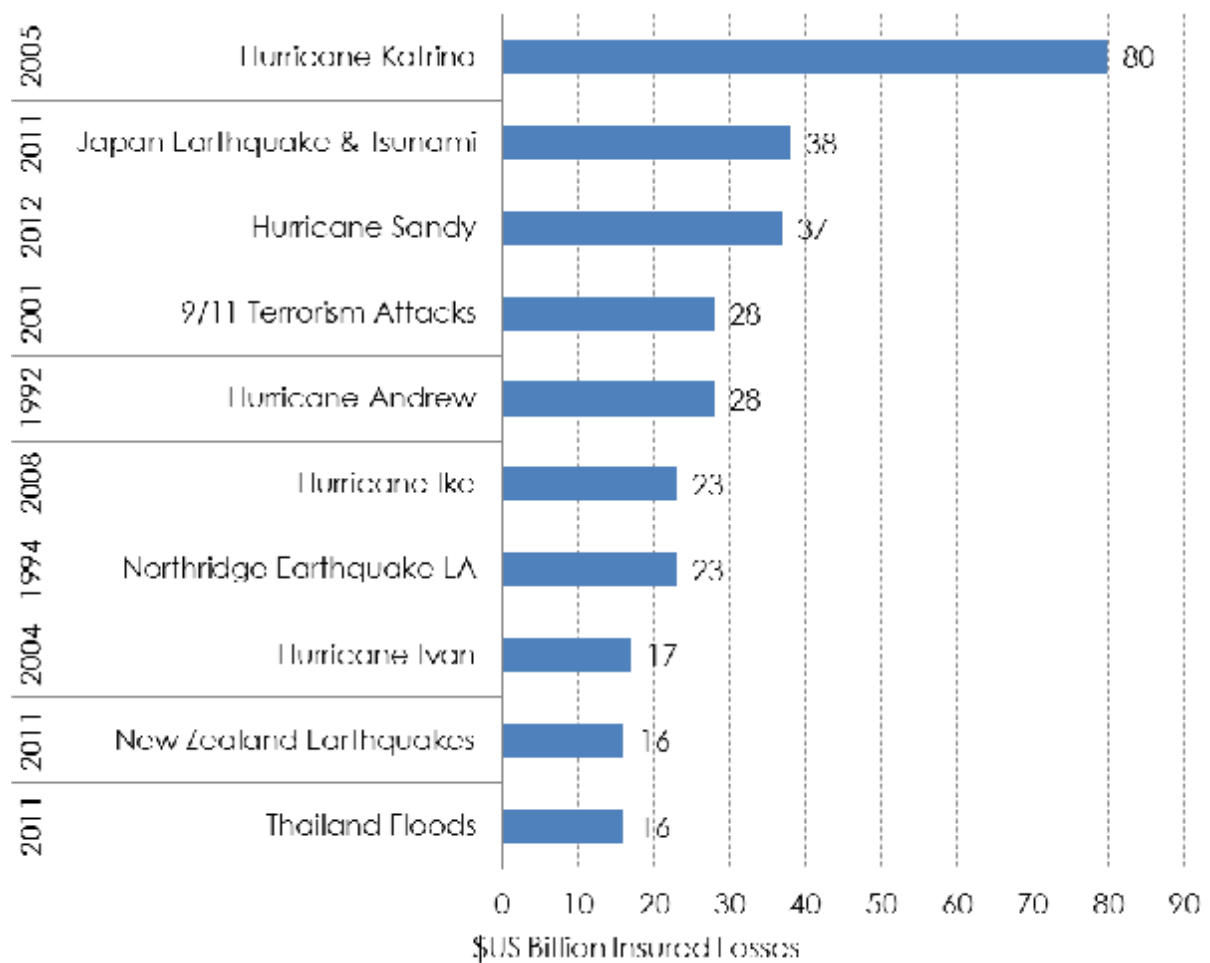
- Events are not random.
- Frequency cannot be predicted, and is uncertain.
- Severity can be catastrophic in scale, and is certain.
- Losses can be disproportionate to the size of effort to undertake.
- Losses are influenced by and mitigated by the security environment.
- Losses can happen anywhere, with a wide variety of targets.

These risk attributes make it difficult for traditional insurance markets to provide cost effective cover for the entire economy that is deep, liquid, and sustainable.

Terrorism as a global loss event

Whilst we know that frequency of events is very uncertain, we also know that loss consequence is highly certain. The terrorist attacks of 11 September 2001 in the USA remains the fourth largest global insured loss event at \$28 billion USD. This includes property, business interruption, life, and workers comp. Figure 3 shows global losses published by Swiss Re, "Sigma", No 1/2014. Please note that the US dollars are indexed to 2013.

Figure 3 – Global major insured losses – Number of attacks

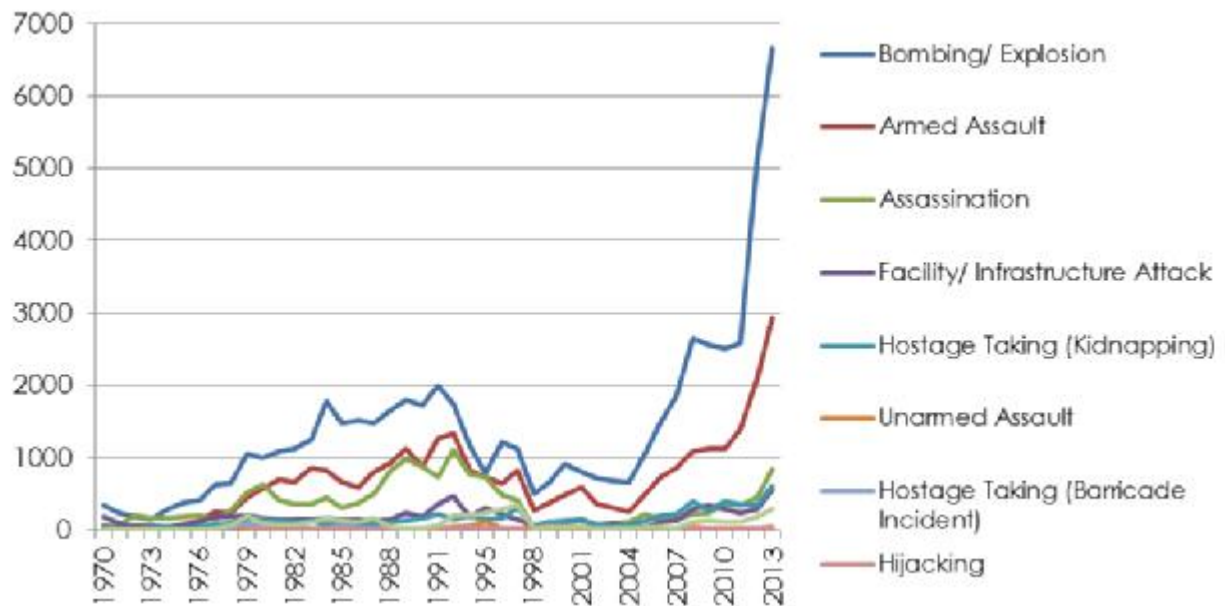


Global terrorism trends

Terrorist attacks have increased fourfold in the last decade. The Global Terrorism Database published by the University of Maryland, USA, shows global terrorist attacks over the period 1970 to 2013. This database shows that the frequency of terrorist attacks has increased significantly over the last decade, mostly attributable to bombings and to a lesser extent, armed assaults.

The database can be found at the National Consortium for the Study of Terrorism and Responses to Terrorism (START), under the Global Terrorism Database (public data file), which can be found at <http://www.start.umd.edu/gtd>. Figure 4 shows the global total trend by type of terrorist attack.

Figure 4 – Global Terrorism database



Australian threat environment

The Australian Security Intelligence Organisation (ASIO) main role is to gather information and produce intelligence that will enable it to warn the government about activities or situations that might endanger Australia's national security. ASIO publishes information on Australia's threat environment at www.asio.gov.au/asio-and-national-security/threat-environment.html.

The ASIO website says that the next five years will be challenging both at home and abroad and will be characterised by:

- 'the terrorist threat from Islamic extremists;
- the proliferation of weapons of mass destruction and attempts to procure technology and expertise in Australia;
- radicalisation trends internationally and in Australia, which will influence the evolution of terrorism;
- the potential for violent protest, nationalist/racist extremism and communal violence;
- continuing rapid changes in technology and telecommunications;

- an increased threat to Australia from Internet-mediated electronic attack;
- continuing growth in international arrivals, placing additional demands on our border control work;
- ongoing demands for ASIO to provide intelligence support to national counter-terrorism arrangements and law enforcement; and
- continuing high levels of attention to the security of special events.'

National terrorism public alert system

The Australian Government also publishes information on national security at the National Security website. This includes information on national security and terrorism for businesses and the community. It also is the source for the national terrorism public alert system.

www.nationalsecurity.gov.au/Securityandyourcommunity/Pages/NationalTerrorismPublicAlertSystem.aspx

The National Terrorism Public Alert System is a range of four levels that communicate an assessed risk of terrorist threat to Australia. The four levels are:

- Low – a terrorist attack is not expected
- Medium – a terrorist attack could occur
- High – a terrorist attack is likely
- Extreme – a terrorist attack is imminent or has occurred.

The Alert System guides national preparation and planning. It also dictates levels of precaution and vigilance to minimise the risk of a terrorist incident occurring. Australia is at HIGH level of alert (since 12/09/2014).

Conclusion 1

The global threat of terrorism is increasing, and there is a heightened awareness in Australia of terrorism risks

Terrorism risks for commercial property insurers

Commercial property assets are concentrated in central business districts, but major regional infrastructure also has concentrated asset exposures. How can terrorism risk impact property insurers in comparison to other potential catastrophes?

Figure 5 – Asset exposures



ARPC exposure modelling

ARPC puts considerable resources into understanding the potential insurance losses of various terrorist attack scenarios to property insurers. In the event of an attack ARPC needs to quickly estimate the impact and advise government.

ARPC analyses its portfolio by:

- Collecting postcode level exposure data from insurers nationally.
- Collecting street address exposure data for Sydney, Melbourne, Brisbane, Perth & Melbourne CBDs.
- Building sophisticated simulation and loss estimation models with the assistance of Geoscience Australia and Attorney-General's Department.
- Understanding potential regional infrastructure exposures.
- Understanding biological and chemical attack exposure.

3-dimensional (3D) terrorism blast loss estimation

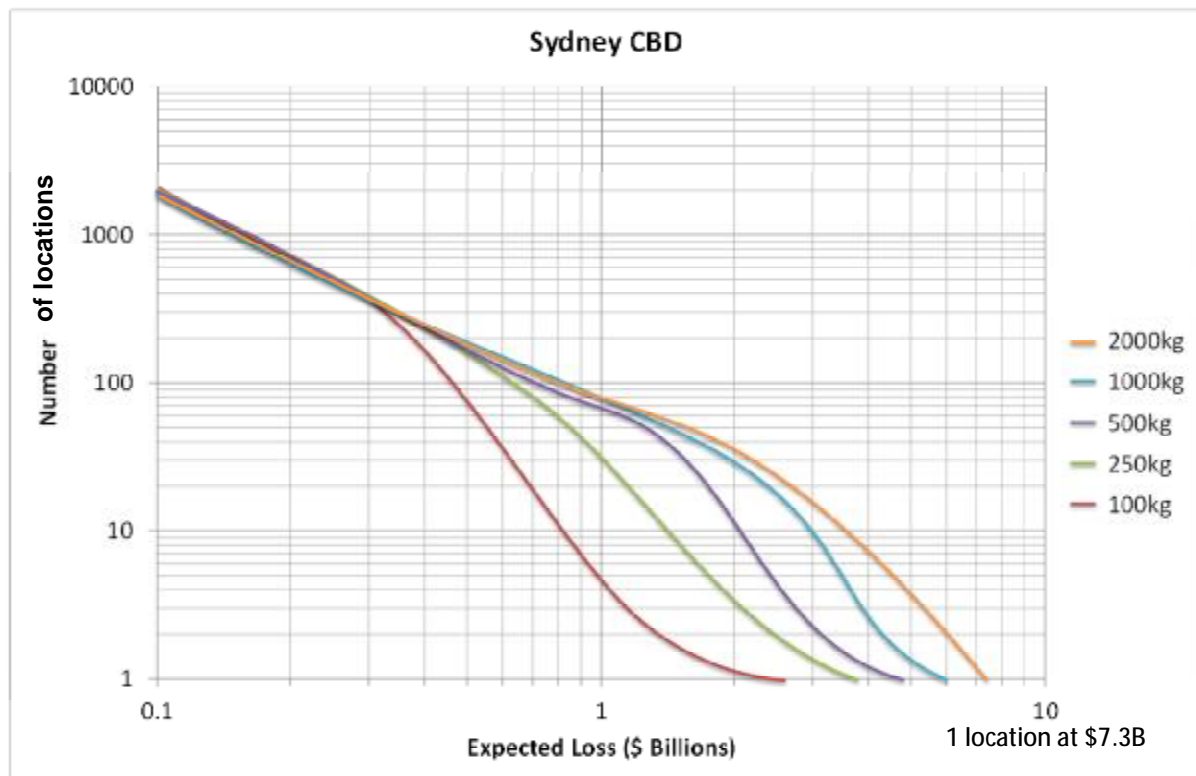
In collaboration with the Attorney-General's Department and Geoscience Australia, ARPC has developed a sophisticated 3D blast model for Sydney and Melbourne CBDs. An example 3D loss estimation from this model shows for Sydney CBD that a blast magnitude scenario of 1,000kg of TNT results in significant insured losses of \$5.3 billion:

- Location sums insured in blast radius
 - \$14.1 billion
- Location insured loss (buildings, contents, business interruption)
 - \$5.3 billion

2-dimensional (2D) terrorism blast loss estimation

ARPC also has a 2D blast model for CBDs. Using this ARPC has modelled Australian cities to develop profiles of the number of locations and expected losses for different scales of blasts. Figure 6 shows the output from the ARPC 2D model for these profiles. For example, a 2,000kg TNT blast has one potential location in the Sydney CBD with a \$7.3 billion loss and a 100kg TNT blast could cause a loss of \$1 billion at 5 different locations.

Figure 6 – Exposure modelling



Terrorism likelihood – or probabilistic models

Whilst the modelling of exposure to terrorism scenarios can be done with some level of sophistication, the modelling of terrorism likelihood is much more problematic.

A recent paper by the RAND Corporation concluded:

“Terrorism risk models based on historical event or theories of terrorist decision making are limited... They cannot extrapolate to estimate the likelihood of future attacks beyond those that have already been recognized.”

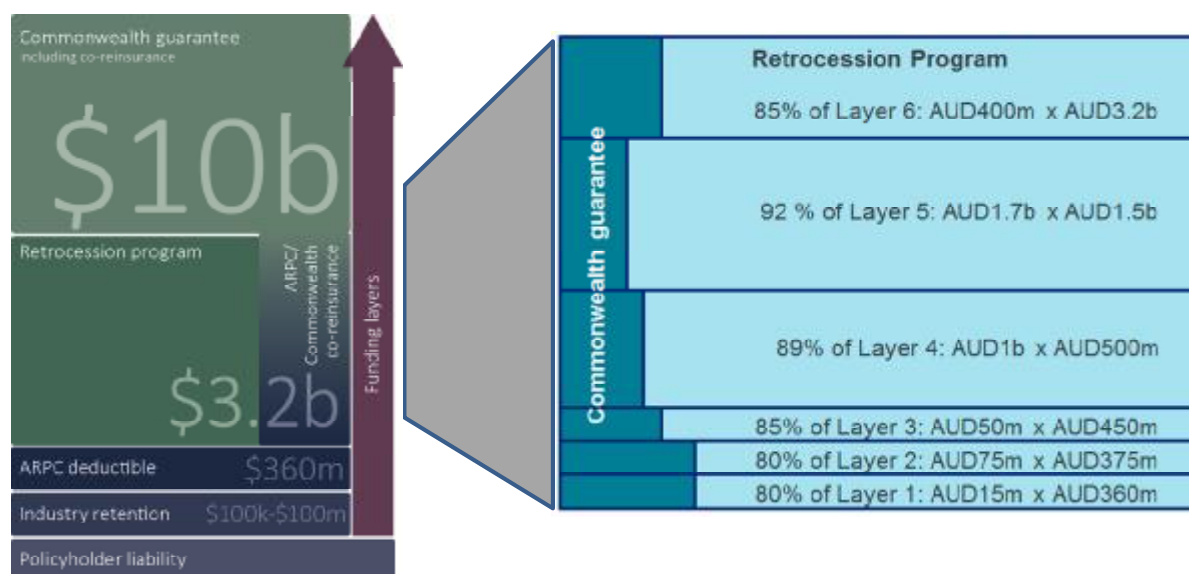
The quote is from “National Security Perspectives on Terrorism Risk Insurance in the United States”, by Henry H. Willis, and Omar Al-Shahery (2014), RAND Corporation.

Over the next few sections of this paper, we will however attempt to show a view on frequency which is derived from a market view of pricing. This view on frequency starts with ARPC interactions with the reinsurance market through the ARPC retrocession reinsurance program.

ARPC scheme structure

As part of the terrorism reinsurance scheme, ARPC buys about \$3.2 billion (including co-reinsurance) annually of retrocession reinsurance on the global market. The program is layered and the two primary layers are offered by subscription. None of the layers are fully filled so that pricing is kept competitive. Figure 7 shows ARPC funding sources as shown in the ARPC annual report 2013-14.

Figure 7 – ARPC funding sources



Australian terrorism reinsurance price – a market view

Figure 8 shows the average rate on line for ARPC retrocession layers transformed to a return period (implied perceived likelihood) against modelled probable maximum losses (PML). The PML curve shows that the availability of private reinsurance is limited and prices reflect perceived risk.

Please note that the insured losses are commercial property, business interruption, and public liability, and all data is sourced from ARPC.

ARPC is a capacity purchaser of reinsurance and within our purchasing strategy we purchase most of the available capacity from reinsurers for the Australian market with S&P ratings of A- or better. Because we have been in the private market since 2009 purchasing capacity reinsurance, we have a detailed knowledge of the pricing and availability of terrorism reinsurance for the Australian market.

We make the following observations through our retrocession purchasing experience:

1. The maximum capacity available of approximately \$3 billion is inadequate to cover an insured PML of \$7.3 billion.
2. Reinsurers tell us that there is no significant additional capacity. They also tell us that their preferred mechanism for providing treaty capacity is through a pool.

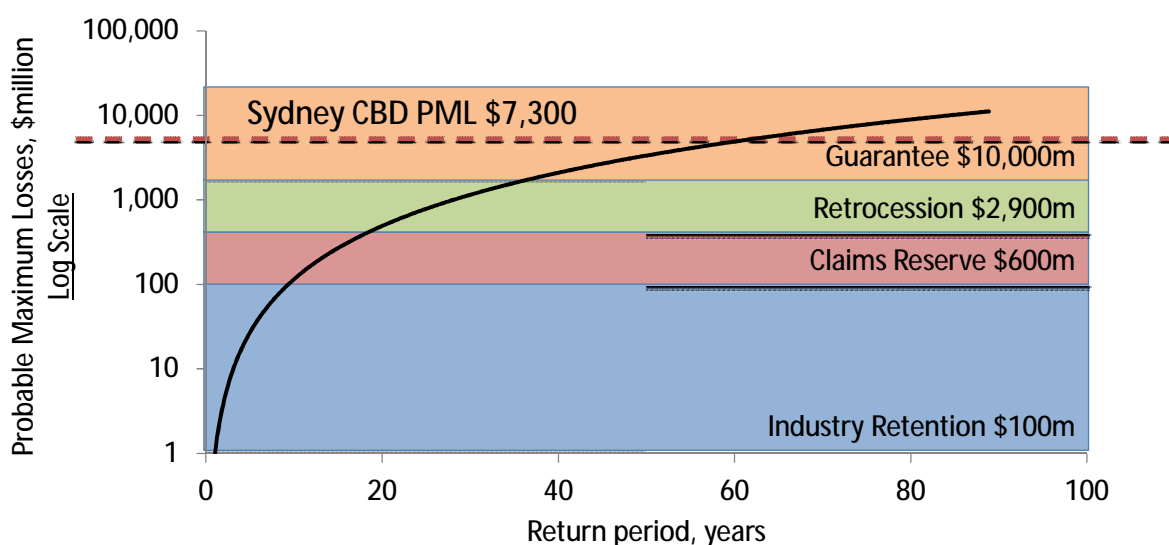
3. Prices reflect a stable market environment with moderate natural catastrophe activity.

In Australia there is a market for individual risk terrorism reinsurance (or facultative) but the market for treaty reinsurance is predominantly offered through pools (or treaties). We purchase reinsurance from global markets including Europe, Lloyds, Bermuda, USA, Asia, and Australia.

In addition to our retrocession reinsurance program, ARPC also pays the Australian Government an annual fee for the Commonwealth Guarantee similar to a fee we pay reinsurers and reflects the attachment level and the limit of the \$10 billion Commonwealth Guarantee.

Figure 8 shows our view on price, implied risk, and PML developed through our retrocession reinsurance costs and our costs to Government. We have also shown an overlay of ARPC loss funding layers.

Figure 8 – PML curve for Australian terrorism reinsurance



The rate on line for reinsurance layers has been translated to an approximate return period. This shows an implicit perceived likelihood of a loss, expressed as a 1 in 'n' period years. It is not possible to directly determine a frequency probability as there have been no insured losses in Australia. However, the rate on line charged reflects individual reinsurer's perceived risk.

The PML curve shown in Figure 8 and Figure 9, when compared to Australian natural catastrophes shown in Figure 9 for events such as earthquakes, cyclones, wildfires, hail storms, shows that the reinsurance market treats the price and risk of a terrorist attack as having a shorter return period than many natural catastrophes at similar PML.

If an event were to occur in Australia, we would expect the return period to potentially become shorter, while the PML should remain unchanged. We would therefore expect prices to increase. Whilst capacity, at best, may remain unchanged, if prices were to increase then ARPC would need to either increase its own prices or reduce its retrocession purchase.

In summary, the global retrocession market's view on terrorism in Australia, based on reinsurance market pricing:

- Small size loss (\$500m), 1 in 20 years
- Medium size loss (\$500m to \$1.5b), 1 in 30 years
- Large loss (\$1.5b to \$3.5b), 1 in 50 years
- Very large loss (\$3.5b to \$13.5b), 1 in 90 years.

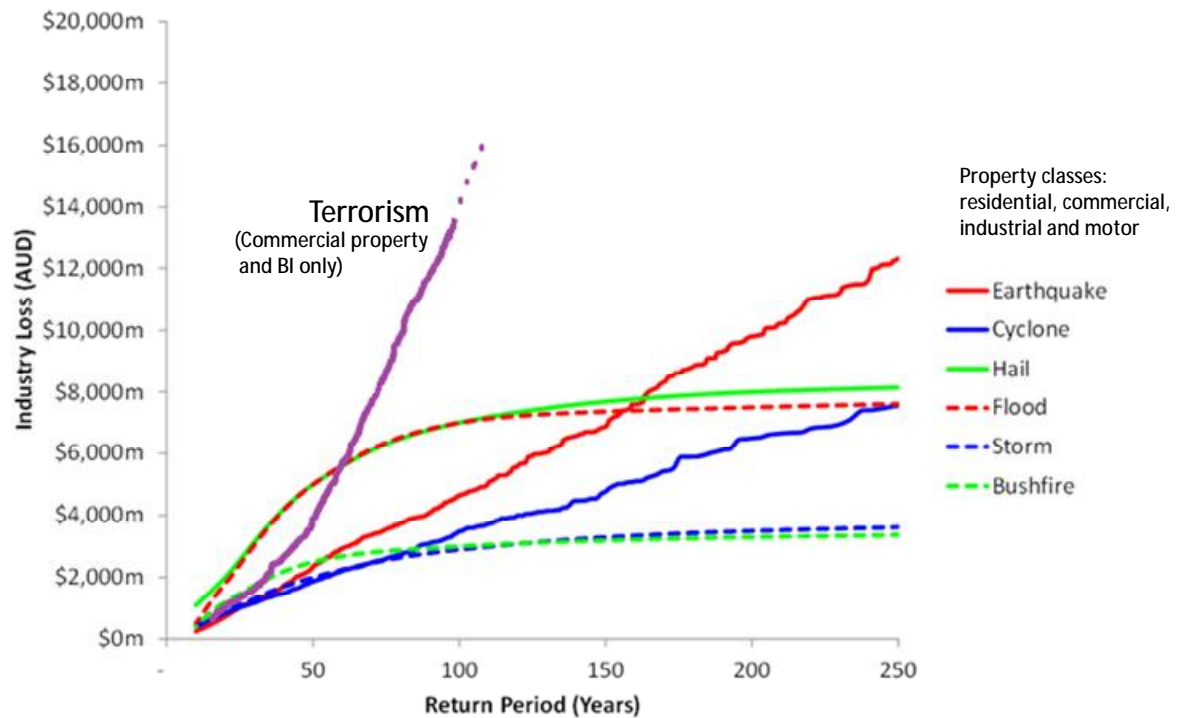
Comparison to natural catastrophes

Using the market view on price and implied return period enables a direct comparison with other natural perils.

An ARPC scheme terrorism insured loss PML line is shown in Figure 9 and compared to natural perils data published by Will Gardner (presented here with permission) at the 2012 General Insurance Seminar of the Institute of Actuaries of Australia.

The source is Gardner, W., (2012) "Practical Stress Testing using Realistic Disaster Scenarios", Australian Actuaries Institute General Insurance Seminar"

Figure 9 – PML curves comparison



Conclusion 2

For return periods less than 1 in 50 years, the market prices terrorism at less than flood and hail but greater than earthquake, cyclone, storm and bushfire.

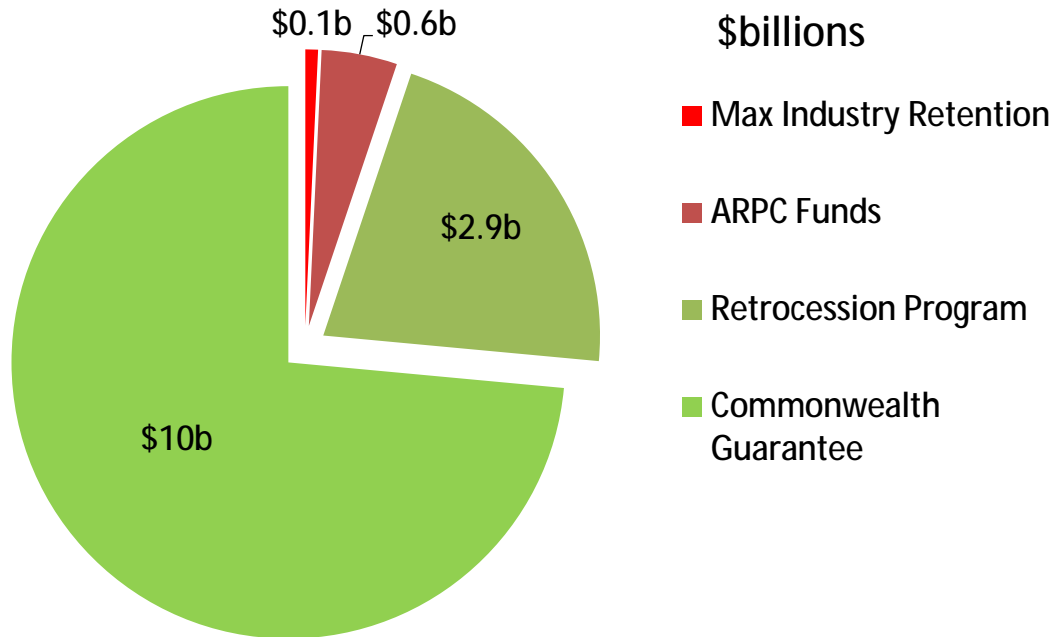
The \$10 billion Commonwealth guarantee excess of \$3.6 billion is priced at a return period of 1 in 89 years.

Question? Is it evidence of the level of risk – or evidence of a limited market with high pricing?

How does ARPC fund losses?

The total value of the scheme is \$13.6 billion comprising insurer retentions, ARPC assets, retrocession reinsurance and Commonwealth guarantee.

Figure 10 – ARPC funding sources



Comparison of ARPC premium rates

The ARPC assets of approximately \$0.6 billion are derived from accumulated reinsurance premiums charged to insurer clients (cedants) less expenses including operating expenses, retrocession reinsurance expenses, and government fees and dividends.

ARPC charges reinsurance premiums to insurers in accordance with a Ministerial Direction, on average of 3.5% of insurer premiums of commercial insurance policies.

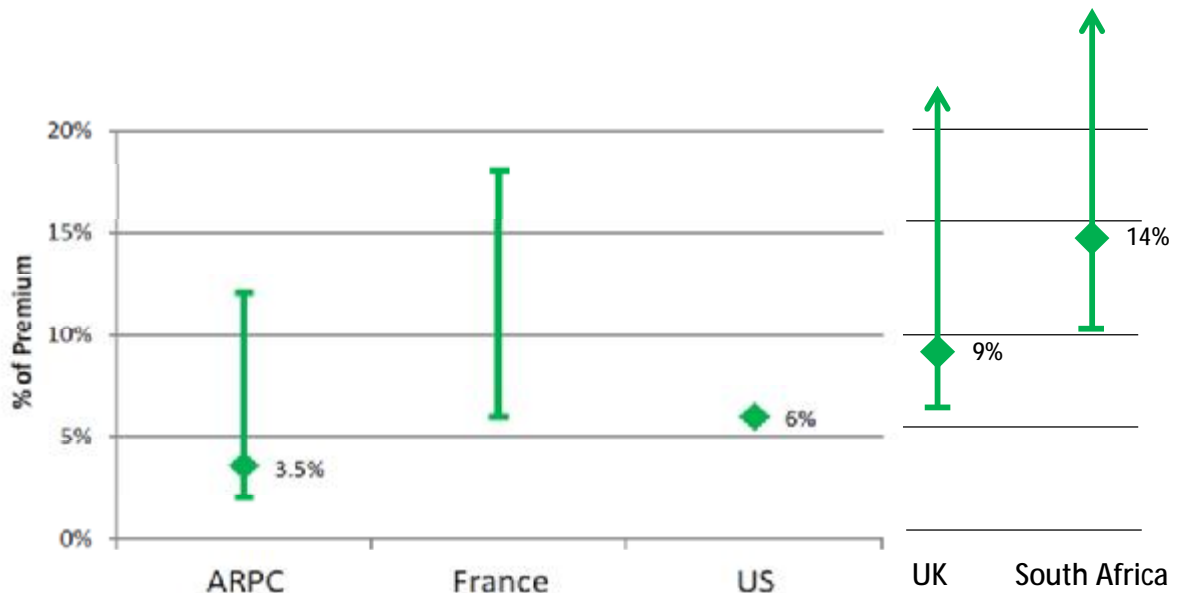
The premium rates were set at the time of establishment of ARPC. ARPC premium rates are low compared to other pools.

Figure 11 shows a comparison of premium rates across terrorism insurance schemes. Sources include:

- "Terrorism Insurance review – Report 2013", by airmic technical.
- "2014 Terrorism Risk Insurance Report – April 2014", Marsh Risk Management Research.

The average premium rates for UK and South Africa are derived by applying the premium rates for those schemes to ARPC exposure information in order to derive a average price comparison (using a weighted average).

Figure 11 – Comparison of terrorism premium rates



ARPC scheme coverage

ARPC provides reinsurance cover to private commercial sector assets.

These assets include:

- Commercial property
- Construction
- Private - road, tunnels, rail track, pipes
- Private - infrastructure, power plants, docks, mines
- Farms with business interruption

The scheme excludes other assets such as:

- Residential property
- High rise residential
- Mixed use commercial and residential
- Marine
- Motor vehicles and CTP

- Rolling stock
- Machinery breakdown
- Aviation
- Workers compensation
- Government property
- Computer crime (cyber)
- Uninsured and underinsured

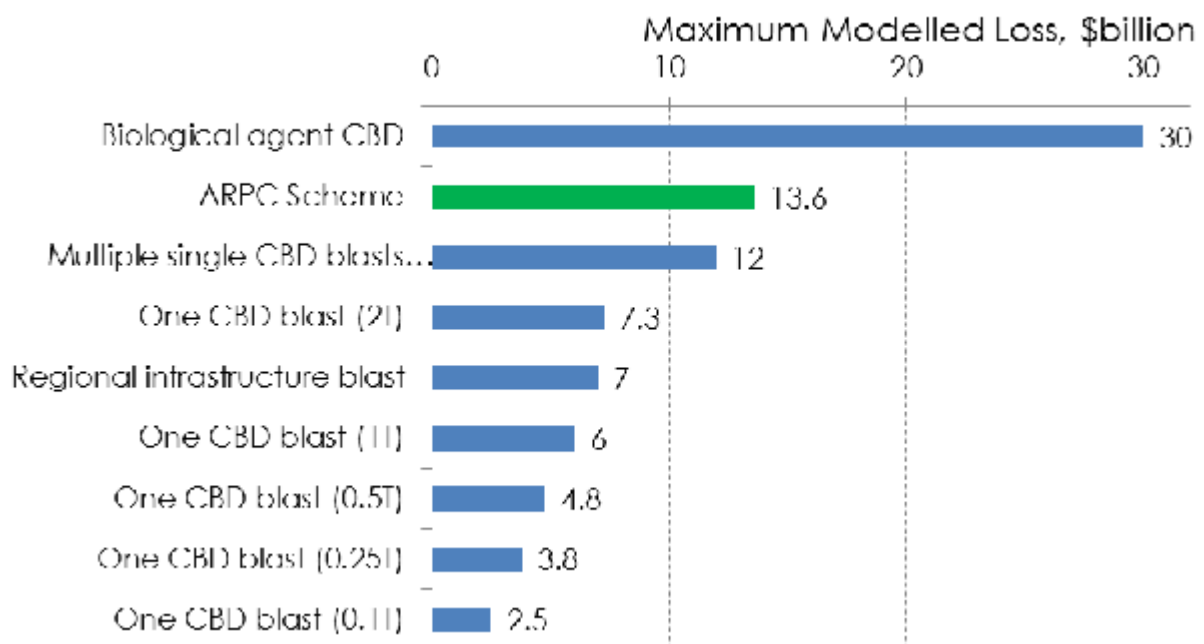
ARPC does not cover non-conventional attacks. Most other terrorism insurance pools in other countries include non-conventional attacks. The Terrorism Insurance Act 2003 specifically excludes nuclear blast and contamination. The Act is silent upon biological and chemical attacks, which are included by the Act, but these risks are then excluded by primary policy pollution and contamination exclusion clauses. War is also excluded.

Biological agent attacks can be very large – in the order of \$30 billion in insured losses.

Australian terrorism insured loss estimates

ARPC modelling in Figure 12 shows insured losses for blasts and plumes can be catastrophic in scale. ARPC funding capacity of \$13.6 billion is sufficient for single blasts and potentially two or more large blasts in a single CBD.

Figure 12 – loss estimate scenarios



Market capacity for terrorism reinsurance

Market capacity is currently not sufficient to cover a PML for the entire market in either Sydney or Melbourne CBDs. Our current benchmark for a PML is for a 2 tonne TNT conventional blast.

Note though that OECD terrorism insurance schemes are generally adopting a 10 tonne ammonium nitrate fuel oil blast as the benchmark PML blast. This is approximately equivalent to 7 tonne TNT blast.

Under the ARPC PML, we observe that:

- Sydney CBD PML is \$7.3 billion.
- Melbourne CBD PML \$4.3 billion (because streets are generally wider).
- The 2014 ARPC retrocession program is \$3.2 billion (including co-reinsurance).
- There is a gap between market capacity and PML.
- Without pooling, market capacity we believe would be less.

Conclusion 3

The ARPC scheme is a sufficient size to cover modelled blast PML for Australian CBD and regional attacks on infrastructure.

ARPC's \$3.2 billion retrocession program (including co-reinsurance) purchases almost all available global capacity offered.

Terrorism risk implications for insurers

The next few sections describe loss potential and capital requirements for insurers for terrorism risk.

As an example, Table 13 shows the top 9 insurers (grouped into threes) insured losses for Sydney CBD 2 tonne blast with a PML of \$7.3 billion. These 9 insurers without terrorism cover suffer a combined loss of \$5.5 billion. This is an example, and assumes even distribution of exposure through the Sydney CBD. If reinsured with ARPC these insurers would have total insurer retention of \$60 million with the rest of the losses recovered as reinsurance recoveries from ARPC. Detail of this example is shown in Table 13 below.

Table 13 – Potential terrorism losses example

	Market share	Total potential loss \$billion (unreinsured)	Total insurer retention \$million (reinsured)
A Group	40%	\$2.9 b	\$17 m
B Group	24%	\$1.8 b	\$22 m
C Group	11%	\$0.8 b	\$21 m
TOP 9	75%	\$5.5 b	\$60 m

Source is ARPC exposure data at end of 2013 financial year.

Terrorism risk impact on insurer's capital

Without terrorism reinsurance, a PML event significantly impacts insurer capital. Table 14 shows example capital impact of a PML blast in Sydney CBD on the top 9 insurers.

Table 14 – Impact on insurer capital

	Current capital base \$billion	Latest APRA statistics (Dec 2013)		SI market share	Postcode 2000 PML scenario	
		Current MCR or PCR \$billion	Current solvency ratio		Total potential loss \$billion	% of capital base
A Group	\$1.6 b	\$0.9 b	1.8	40%	\$2.9 b	177%
B Group	\$2.0 b	\$1.3 b	1.5	24%	\$1.8 b	88%
C Group	\$3.0 b	\$1.8 b	1.7	11%	\$0.8 b	27%
TOP 9	\$6.6 b	\$4.0 b	1.7	75%	\$5.5 b	83%

ARPC reinsured versus not reinsured

If an insurer is reinsured with ARPC then the contribution of terrorism risk to “other accumulations vertical requirement” is a maximum of \$10 million (retention) for an insurer and \$100 million total for all (industry retention).

If not reinsured with ARPC then an insurer may be exposed to a share in a loss of a terrorist attack. For some insurers the losses could exceed capital base.

Insurer protection under the Act

Insurers who reinsure with ARPC are offered significant capital protection through the Terrorism Insurance Act 2003.

If an insurer is reinsured with ARPC then:

- ARPC is liable, and not the insurer.
- Eligible contracts of insurance are protected.
- The Commonwealth guarantee is available.
- The legislated reduction percentage applies for very large losses to limit liability.

If an insurer is not reinsured with ARPC then:

- The insurer is liable.
- The Commonwealth guarantee is not available.
- The legislated reduction percentage is not applied.

Conclusion 4

Insurers may have significant terrorism exposures, and this should be considered in capital adequacy calculations if they are not reinsured with ARPC.

Some insurers face exposures in the order of \$1 billion.

Conclusion

The threat of terrorism is real and increasing globally. In Australia there is a heightened awareness of terrorism threat. Terrorism insurance pools are an effective way to efficiently fund potential losses. Insurers should consider terrorism risks in capital adequacy if they are not reinsured with ARPC. Finally, ARPC delivers significant capacity and value to the market.

For more information on ARPC visit www.arpc.gov.au.

Email enquiries to enquiries@arpc.gov.au or Christopher.Wallace@arpc.gov.au.

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