

Are the Pacific Islands Insurable? Challenges and Opportunities for Disaster Risk Finance

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Abstract

There are several efforts underway in the Pacific Islands to insure public and private assets against natural disasters such as cyclones and earthquakes. These efforts are designed to mitigate the annual costs of such disasters which range from a few percent to over 50 percent of GDP. However, insurance is not a substitute for aid. Most islands are heavily aid dependent and cannot afford to pay the high premiums associated with disaster risk insurance. Insurance to cover disaster risk likely needs to be subsidized to offset costs and to build trust. Governments and donors must also manage basis risk which can be substantial. Over time, investments in resilient infrastructure, coupled with a more comprehensive approach to risk management, may reduce costs and shift premiums to recipients. Finally, current and proposed schemes which provide insurance cover or other products must provide information in a transparent manner on effective demand along with costs, benefits and administrative fees. A clearly defined exit strategy is necessary if funds are not disbursed in a timely manner.

Keywords: disaster risk, finance, insurance, Pacific Islands

JEL: G0, O1, O2

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We are grateful to Masood Ahmed, Nancy Birdsall, John Bishop, Hayden Everett, Alan Gelb, Claire James, Nicola Jenns, Kate Kinsela, Jeremy Konyndyk, Frank LaMacchia, Nicola Ranger, Ganesh Rasagam, Cate Rogers and to seminar participants at the Department for Foreign Affairs and Trade Australia and the Development Policy Centre at Australian National University for helpful comments. Special thanks to David Traill for sharing his expertise and for detailed comments and to Mallika Synder for excellent research assistance. We are, of course, solely responsible for any errors.

The Center for Global Development is grateful for contributions from the Australian Department of Foreign Affairs and Trade in support of this work.

Vijaya Ramachandran and Junaid Sadiq Masood, 2019. "Are the Pacific Islands Insurable? Challenges and Opportunities for Disaster Risk Finance." CGD Working Paper 516. Washington, DC: Center for Global Development. <https://www.cgdev.org/publication/are-pacific-islands-insurable-challenges-and-opportunities-disaster-risk-finance>

The data used in this paper is available here: <https://www.lowyinstitute.org/the-interpreter/pacific-aid-map-update>. More information on CGD's research data and code disclosure policy can be found here: www.cgdev.org/page/research-data-and-code-disclosure.

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1. Introduction: Aid Dependence and Disaster Risk in the Pacific Islands

The Pacific Island Countries (PICs) are grappling with the deleterious effects of natural disasters and climate change, which have the potential to—in the case of some smaller island nations make entire countries inhospitable, posing significant development challenges. Over the past decade, several initiatives have been undertaken to help improve disaster assistance and cooperation in the region.

The Pacific Islands region consists of thousands of islands stretching across the Pacific Ocean. Countries in this region share similar challenges and opportunities as small and remote island economies. They are small, have limited natural resources, far away from major markets, and vulnerable to external shocks; all of which has resulted in low growth and a high degree of economic volatility (World Bank, 2019). These islands are also among the most vulnerable to natural disasters. According to the World Risk Report, five Pacific countries are among the top 20 most at-risk countries in the world, with the highest average annual disaster losses scaled by gross domestic product (World Bank, 2019). The cost of damage and loss suffered in PICs as a result of recent natural disasters ranges from a few percent to over 30 percent of national gross domestic product (GDP) (PCRAFI, 2015). Maximum losses sustained during very severe disasters can exceed 100 percent of GDP.

The Pacific Island Countries (PICs) are mostly small economies that are likely not viable without high levels of foreign assistance. Table 1 shows that aid per capita ranges from a few hundred dollars to over \$8000. Administering these flows is expensive—while data are not available on overhead costs, anecdotal evidence suggests that these costs are high, especially for the multilateral agencies. In 2016, the total amount of aid spent was \$1.87 billion across 3875 projects (Lowy Institute, 2019). The top five donors were Australia (\$799 m), New Zealand (\$192 m), Japan (\$181m), China (\$114 m), and the Asian Development Bank (\$104 m). The World Bank Group spent \$94 m across 55 projects. China is a rising influence in the region, spending between \$100 million and \$400 million per year during the period 2011 to 2016.

The top five recipients were Papua New Guinea, Oceania (Regional), Solomon Islands, Vanuatu, and Fiji. Aid per capita ranges from \$80 for PNG to over \$9000 for Tonga. Excluding PNG and Fiji, aid to GDP is about 30 percent. These numbers are by far, the highest in the world—no other region comes close. Aid per capita in sub-Saharan Africa ranges from about \$20 to \$150. The Caribbean islands receive a few hundred dollars in aid per person; aid to St Kitts and Nevis is around \$500.

Table 1. Aid flows to the Pacific Islands

Country	Aid (spent) USD millions	Population	GNI per capita	Aid per capita	Aid to GNI (%)
Cook Islands	\$35.61	17000	\$17000	\$2094	12
Fiji	\$127.6	899000	\$4969	\$141.93	3
Kiribati	\$55.71	114000	\$2042	\$488.68	20
Marshall Islands	\$29.77	53000	\$4678	\$561.70	12
Micronesia	\$77.5	105000	\$3662	\$737.62	20
Nauru	\$24.1	11000	\$9420	\$2190.90	23
Niue	\$14.15	1624	\$18000	\$8713.05	48
Palau	\$18.34	22000	\$13000	\$833.64	6
Papua New Guinea	\$652.36	8080000	\$2352	\$80.74	3
Samoa	\$116.35	195000	\$4115	\$596.67	14
Solomon Islands	\$189.23	599000	\$1742	\$315.90	18
Tonga	\$101.36	107000	\$3827	\$9473.00	25
Tuvalu	\$25.16	11000	\$5363	\$2287.27	43
Vanuatu	\$53.59	27000	\$3045	\$568.85	19

Source: Lowy Institute. All values are in current US dollars

Table 2. Likelihood of natural disasters in the Pacific

Country	Likelihood of natural disaster per year (%)	Likelihood of severe natural disaster (%)	Damage (%GDP, median)	Damage (%GDP, maximum)	Population affected (median)	Population affected (maximum)
Fiji	70.3	8.3	1.3	10.1	0.8	39.7
Kiribati	10.8	2.7			0.8	100.0
Marshall Is	16.2	5.4			1.1	38.3
Micronesia	24.3	5.4	1.8	3.5	5.7	97.8
Palau	2.7	0.0				
PNG	81.1	8.1	0.1	1.3	0.4	32.7
Samoa	27.0	18.9	21.0	161.8	1.6	6.7
Solomon Is	51.4	13.5	8.0	14.0	1.1	53.8
Timor-Leste	21.6	2.7	0.1	0.1	0.1	10.1
Tonga	29.7	8.1	4.9	28.2	3.4	100.0
Tuvalu	16.2	2.7			42.0	42.6
Vanuatu	56.8	29.7	18.0	131.2	5.3	87.0
PICs	34.0		1.7	161.8	1.3	100.0

Source: EM-DAT, Lee et al IMF (2018). Severe is defined as a disaster in the 75th percentile of losses; the second column shows the average probability per year that each country experiences a natural disaster above 75th percentile over the sample period (1980-2016).

Table 3. Losses from natural disasters

Country	Median losses (\$million)	Maximum losses (\$million)	Median losses as % GNI	Maximum losses as % of GNI
Fiji	62.6	486.5	1.3	10.1
Kiribati				
Marshall Is				
Micronesia	7.0	13.7	1.8	3.5
Palau				
PNG	19.7	256.2	0.1	1.3
Samoa	171.0	1317.2	21	161.8
Solomon Is	97.9	171.3	8	14.0
Timor-Leste	2.6	2.6	0.1	0.1
Tonga	21.3	122.5	4.9	28.2
Tuvalu				
Vanuatu	153.7	1120.3	18	131.2

Source: Lee et al IMF (2018), Lowy Institute, authors' calculations. Loss data are not available for all islands.

In addition to being heavily aid-dependent, the PICs are highly exposed to adverse natural events, including tropical cyclones, earthquakes, volcanic eruptions, and tsunamis, which can result in disasters affecting their entire economic, human, and physical environment. These events impact the PICs long-term development agendas. From 1950 to 2009, storm and earthquake damage cost the PICs an estimated US\$3.2 billion (PCRAFI, 2015). A tsunami that hit Samoa in September 2009 generated damage and losses in excess of US\$120 million, or 22 percent of gross domestic product (GDP) (Government of Samoa, 2009); a tropical cyclone hitting the country four years later caused damage and losses in excess of US\$200 million or 28 percent of GDP (Government of Samoa, 2013). The worst disasters, such as the two tropical cyclones that hit Vanuatu in 1985, result in losses greatly exceeding the value of GDP. There is quite a lot of variance in the

magnitude of disasters from year to year and also geographically; the southern islands appear to suffer more than their northern neighbors.

Table 2 shows the likelihood of a natural disaster in the PICs. Table 3 translates these probabilities into losses measured in US dollars—many islands lose millions of dollars of assets in the aftermath of a natural disaster. We can see that PICs are prone to disasters—Fiji has a 70 percent probability of a disaster in any given year while Papua New Guinea has an 81 percent chance. Vanuatu and the Solomon Islands have a greater than 50 percent chance of a natural disaster in any given year. Vanuatu has an almost 30 percent chance of a disaster being in the 75th percentile of severity in any given year, this number is 13.5 percent for the Solomon Islands and 8.1 percent for Tonga. Appendix 1 describes the most significant weather events in the Pacific since 2010.

Critical challenges confront PIC governments in the aftermath of a disaster including securing access to short-term immediate financing for emergency response and maintenance of essential government services until additional resources become available. This danger is compounded by the limited set of options for PICs to raise funds in the immediate wake of a disaster. PICs are constrained by their size and borrowing capacity and have limited access to international insurance markets (Cummins & Mahul, 2009). In addition, many PICs have a narrow revenue base, are net importers, and rely on aid as an income stream, all of which place significant additional constraints on the national budget. The geography of PICs also poses challenges to post-disaster relief efforts that are unique to small island nations. For example, significant costs are incurred to facilitate travel to the outer islands for initial post-disaster relief. Following Cyclone Ian in Tonga in early 2014, 39 percent of initial relief expenditures from the emergency fund went to fuel, distribution, and travel and freight (PCRAFI, 2015).

Without immediate access to capital in the wake of a disaster to rebuild critical infrastructure and assist households and businesses, delays in recovery have led to secondary economic and social effects, such as deterioration in trade, budget imbalances, and increased incidence of poverty (Linnerooth-Bayer & Mechler, 2007). Individuals have had to rely on savings and assistance from family members, but these sources are insufficient in the face of a large-scale disaster. Without pooling arrangements or external assistance, disasters can lead to a worsening of poverty as victims take out high-interest loans (or default on existing loans), sell assets and livestock, or engage in low-risk, low-yield farming to lessen exposure to extreme events (Varangis, 2005).

All of this points to the need for some form of disaster risk finance, including insurance against natural disasters. Insurance would help to address some of the above-mentioned problems by smoothing out payments by donors and PIC governments. However, there is also uncertainty about when and how the insurance pays out; insurance is not likely to be a market-based solution that replaces the large amounts of aid currently being disbursed. Section 2 looks at the insurability of the islands and assesses some of the key challenges. Section 3 suggests components of insurance coverage that are relevant to the Pacific Islands while Section 4 describes the various schemes proposed or underway. Section 5 concludes.

2. Are the Pacific Islands Insurable?

While there is a need for disaster risk finance, there is also a particular set of challenges to providing insurance in the Pacific islands. Most important is the cost of insurance premiums which is driven by the high probability of a natural disaster. For countries that are already heavily dependent on aid, these premiums are likely to be unaffordable. Other issues such as the lack of resilient infrastructure and the lack of trust in insurance providers are also important. We can sum up insurability as five questions (1) can they pay? (2) is the model good enough? (3) do they trust? (4) has risk been reduced? (5) will reinsurers support?

- *Affordability of premiums:* The Pacific Islands are a unique set of countries. They are heavily aid-dependent and prone to natural disasters which runs into millions of dollars every year. While there is some market-based activity, this alone is not enough to sustain the population. It is therefore very unlikely that they can afford to pay the premiums associated with insurance contracts that might cover a significant portion of losses each year. Aid as a percentage of GNI is sometimes over 100 percent and aid per capita is higher than any other region in the world. As such, the notion of a market-based insurance model makes no sense.

The PICs are also subject to natural disasters which from time to time, has resulted in large losses. Private insurers are likely to be conservative, and with good reason, so insurance will be costly (unless it is parameterized in ways that severely limit payout which is not very useful). This, together with aid dependence, indicates that insurance to cover disaster risk likely needs to be subsidized for a significant period of time, to offset costs and to build trust. This will work best if accompanied by significant investment in infrastructure. Linking risk transfer (premiums) to risk reduction (investments in resilience) requires careful design of contracts.

Insurance premiums can be funded from a variety of bilateral or multilateral sources, thereby reducing the burden on the largest donors. Over time, investments in resilient infrastructure, coupled with investments in economic development and a more comprehensive approach to risk management, may reduce costs and shift some of the premium payments to recipients. It is worth noting that insurance premiums for flood and other types of disaster insurance have been subsidized in rich countries such as the United States, the United Kingdom and Australia for long periods of time; some subsidies continue to this day.

- *Basis risk.* In the aftermath of a natural disaster, insurance payouts may differ from the policyholder's expectation. The possibility that such a difference might exist is known as "basis risk". Simply put, basis risk is the difference between expectations and outcome. For the Pacific Islands, this is a very important type of risk, one that is often not emphasized enough. Meenan (2017) provides an excellent explanation of basis risk; this is summarized below (with additional commentary relevant to the Pacific).

Parametric insurance—where payouts are linked to a set of indices—is most commonly associated with basis risk, although other types of insurance also bear this risk. For indemnity insurance, basis risk may arise from

the possibility that there is no payout because of a legal miswording.¹ Basis risk may also arise because of the difference between index loss and actual loss after an event. For example, for parametric insurance, the difference between the index loss calculated from a wind speed measurement and the actual loss may be the source of basis risk. This is a source of friction for the Pacific Islands.

Parametric-based insurance covers can be expensive to develop (building a loss index is costly or may have high basis risk if corners are cut) and the cost of running a model can be expensive (claims handling cost). When losses are at or below the deductible, the insurance company must tell the insured that there was not a valid loss as the damage was not high enough.

Basis risk can be quantified by identifying the underlying sources of uncertainty. Quantifying this type of risk helps to set expectations and to minimize (if not close) the gap between expectation and outcome. If the expectation from a risk holder is that a payout should be received after an event, then the index attachment level (as defined in parametric insurance contracts) can be lowered, and the trigger can be biased towards overpayment. This may lead to a more costly premium.² Meenan (2017) argues that another option may be to introduce a “phased attachment,” where there is a small payout at a lower threshold with the remainder of the payment structured to be paid out at a higher threshold. This may help to manage reputational risk associated with a binary trigger structure.

The best approach to reducing basis risk requires a detailed understanding of the sources of uncertainty. One way to reduce the basis risk is to increase the number of measurement stations; this may reduce the difference between estimated and actual loss. Another is to evaluate various index formulae to better capture the range of vulnerabilities. For the Pacific Islands, better satellite coverage of the islands will help as well ongoing efforts to share data; currently, data are often not available for the outer lying islands. Basis risk cannot be completely eliminated but can be managed with the appropriate analytical approach.

- *Lack of trust:* There is often a lack of understanding about risk and insurance, and a lack willingness to mitigate risk through insurance (Prabhakar, Cummins, Pereira, & Pulhin, 2014). There is general distrust of insurance, due to experience of mismanagement or lack of payouts or difference in payouts arising from indexed vs actual losses arising from basis risk. People living in disaster prone areas expect public support such as financial aid after major disasters and are less willing to purchase. Weak mechanisms for distributing payouts are also a problem--without efficient and transparent systems, there is a potential for leakage in the flow of payments to people (Clarke & Hill, 2013). Also,

¹ Indemnity insurance is a contractual agreement in which one party guarantees compensation for actual or potential losses or damages sustained by another party.

² The attachment point is the amount that an insurance company will pay for a risk, as stipulated by the relevant regulatory authority. An insurance commissioner typically sets the amount to make sure that the insurer is financially capable of covering the risk. For example, if the attachment point of a risk is \$100,000, then the insurer cannot promise coverage for a loss beyond that amount. If an amount beyond the attachment point is being considered, the insurer would have to turn over the excess to a reinsurer.

many insurers in the Pacific are branches of international companies which may apply risk profiles based on higher returns and less risk exposure than the Pacific region. Insurance companies tend to adopt a conservative approach when there is a lack of market information (Subramanian & Yahel, 2013).

- *Lack of resilient infrastructure, inadequate building codes, and certification mechanisms:* Inadequate development and enforcement of building land-use planning regulations, and over-reliance on disaster response rather than mitigation, are significant problems. Cyclone insurance for property also requires certification of compliance with building codes, but there is a shortage of qualified civil engineers in the region, weak enforcement of building codes, and in some countries, such as the Marshall Islands, there are no building codes in place to begin with (Mahul, Cook, & Bailey, 2015). Pacific island governments often lack up-to-date asset registers, leading to undervaluation of assets. Identifying public properties to insure and maintaining a centralized register could help governments attain better prices when approaching the market (Mahul, Cook, & Bailey, 2015).

Valuation of public assets is also sometimes a dilemma for PICs—they may have an incentive to undervalue an asset—say it is more run down or say the hazard is bad and getting worse because of climate change—to get development funding or overvalue it—say it is more resilient and that the hazard isn’t as high as the science says—to make it insurable, even if it is then only partially insured.

- *Limited availability of reinsurance:* Few national and international reinsurers operate in the region (only 34 companies in 2013). These companies tend to be small and have low capital and solvency and pass on high administrative costs to consumers in the form of higher premiums. Capacity within the reinsurance market is limited, which limits the size of risk accepted and keeps premiums high (Mahul, Cook, & Bailey, 2015). Insurers and reinsurers cannot afford to operate in the region unless there is a sufficient enabling environment including efforts to reduce the residual risks (Prabhakar, Rao, Fukuda, & Hayashi, 2013) (Prabhakar, Cummins, Pereira, & Pulhin, 2014).

These challenges, while difficult, are not insurmountable. In the next section, we discuss concepts that might be relevant for efforts to introduce insurance to the Pacific region.

3. Key Components of Insurance Coverage

Subsidies to premiums

What is the best way to subsidize premiums? As discussed earlier, these are largely unaffordable for most countries in the Pacific. Premiums can be subsidized by concessional financing facilities such as the World Bank’s IDA or by one or more of the several regional facilities currently under consideration. They can also be financed by bilateral donors. However, it is also important that countries being insured have some stake in the program. Perhaps they can pay 25 percent of the insurance premium, thereby demonstrating some demand and commitment to the scheme while also building administrative capacity. Over time, this share can

increase, particularly as infrastructure becomes more resilient to disasters. However, we cannot expect this to happen in the near term; donors who want to build an insurance program in the Pacific must be prepared to finance premiums for a substantial period.

Use of parametric triggers

Index insurance offers new opportunities for managing disaster risk in the Pacific islands (Talbot & Barder, 2016). Index insurance is insurance that is linked to an index, such as rainfall, temperature, humidity or crop yields, rather than actual loss. Whereas traditional insurers have to wait to estimate the amount of losses before paying out, an index-insurance payout is activated once the index crosses a prespecified level. Another advantage is that the transaction costs are lower which in theory at least makes index insurance financially viable for private-sector insurers. Index insurance is also subject to less adverse selection and moral hazard than traditional insurance.

Parametric triggers must be used with caution. Although they allow for rapid claims settlement, they lack the flexibility of softer triggers, like a declaration of natural disasters by the relevant authority (local or national). This limits the abilities of PICs to claim damages from disasters that are costly but just below the trigger criteria. Basis risk is a significant issue, as discussed above. Soft triggers, such as a declaration of disaster by a relevant government authority, may work better in some circumstances.

Insurance for public assets

Most state-owned enterprises in PICs have some form of property insurance, but the purchase of insurance is not centrally coordinated or recorded. Several PICS have expressed their concern at not being able to purchase infrastructure insurance from the marketplace. It was either too expensive or simply not available. For example, accessing cyclone insurance for property requires an engineer's report certifying that the insured property meets the building code. In order to better underwrite the cyclone peril, insurers require that buildings be inspected and certified by local structural engineers. Given the low number of qualified civil engineers in the region, this can be both expensive and time-consuming. Weak enforcement of building codes is not uncommon in the region, given limited capacity; some countries, such as the Marshall Islands, have no building code in place.

PICs lack up-to-date centrally held asset registers or insurance registers. Assets can be undervalued if replacement values are out of date. Identifying a pool of key public properties to insure and approaching the market could help PIC. There is an urgent need to improve data collection measures and consolidate existing data to effectively assess risk exposure of public infrastructure. Most PICs currently lack a central register which tracks the assets held by government departments, statutory authorities, and commercial companies, and whether there are any insurance mechanisms in place to protect these assets.

Investments in resilient infrastructure

Across the Pacific region, there is an urgent need to build and replace infrastructure to ensure greater resiliency to climate change and natural disasters. Much of the critical infrastructure in the region is at risk from future sea level rise, storm surge, flooding, and/or drought. There is a need to strengthen resilience by “climate-proofing” infrastructure and building more sustainable communities. The dialogue on investing in resilient infrastructure is best framed by a consideration of the benefits and costs of investing in resilience, looking at the savings in post-disaster costs for every \$1 spent on resilient infrastructure. The Pacific Region Infrastructure Facility is a useful source for existing research. It describes two initiatives progressing through the Pacific Island Forum (PIF)—the Pacific Resilience Facility (PRF) and the Pacific Island Climate Change Insurance Facility. These initiatives are guided by the overarching Framework for Resilient Development in the Pacific (FRDP).

According to the World Bank, the three steps required to ensure resilient infrastructure are:

- i. *Locational Mitigation*: Risk-sensitive land-use planning methods should guide where to build new infrastructure;
- ii. *Structural Mitigation*: Existing infrastructure should be upgraded to resilient designs; and
- iii. *Operational Mitigation*: Emergency preparedness and recovery planning steps should be put into place.

Policymakers can also use climate risk and vulnerability assessments (CRVAs) to determine climate risks and explore alternative approaches and designs, such as elevating roads and bridges, increasing drainage capacity, and drought-proofing water supplies.

Comprehensive financial packages, combining reserves, contingent credit and risk transfers, may optimize the variety of instruments described above. A carefully designed insurance program may be able to link investments in resilient infrastructure to the cost of premiums, thereby creating incentives for governments to make such investments. The Asian Development Bank is currently talking to PCRIC to house a contingent savings program, hence offering a combined savings/risk transfer solution to the PICs. “Cat pools” can also be used as a platform for additional services and products. The World Bank has been exploring the insurance of public assets and is trying to facilitate access to international reinsurance for domestic insurers. To this end, the World Bank is working with PCRIC to establish a private sector window for reinsurance.

Bundling of insurance products and strengthening requirements for coverage

In some economies, disaster insurance coverage has been expanded by combining it with other products, such as adding it to fire insurance policies (OECD, 2015) (Tigre, 2013). Requiring insurance coverage or risk mitigation for certain kinds of transactions can also broaden coverage. For example, in Fiji, banks require insurance against specific hazards before lending, and insurance is only available when building standards have been certified by an insurance industry-approved engineer. This strengthens coverage, although

loopholes do exist, such as developers securing insurance offshore without a local engineering certification (Wright, 2013). In areas more prone to disasters, governments may even require mandatory insurance and work with industry to develop appropriate products for such circumstances (Tigre, 2013). There is also evidence that disaster losses may be reduced when insurance premiums are reduced to reward voluntary mitigation measures, but few such incentives are currently offered and voluntary actions by business owners are uncommon (Wright, 2013).

Layering of instruments for disaster risk management

Traill et al (2019) and others emphasize that disaster risk finance must be provided as part of a larger package of assistance, which focuses on knowledge sharing, risk pooling, capacity building and long term investments in public and private infrastructure. This assistance package must also embody deep knowledge of the islands, local customs and culture. Traill et al provide very good advice for donors looking to engage in the Pacific.

4. Insuring Individuals: The Scope for Microinsurance

The intent of microinsurance is to service low-income markets by offering limited coverage and reducing transaction costs (Mechler, Linnerooth-Bayer, & Peppiatt, 2006). Until recently natural hazards have not been explicitly considered as a niche for microinsurance because they impact large regions with multiple and simultaneous losses, and thus are both more uncertain and have higher potential losses than other types of insurance. The co-variant or systemic nature of the risks – and the large capital reserves necessary to avoid insolvency - distinguishes catastrophe coverage from health, accident and other forms of microinsurance. Various innovative programs are emerging with the support of governments, NGOs, and international donors.

Forms of microinsurance

Disaster microinsurance can cover sudden-onset events, such as earthquakes, floods, and cyclones, as well as slow-onset events, such as droughts. Traditionally, insurers have paid claims based on actual losses to households, businesses, and farmers. This requires extensive networks of claims adjusters who assess individual losses following an event. This type of insurance is referred to as indemnity-based insurance.

Recently, index-based schemes for slow-onset events have emerged. Index-based insurance is distinguished from indemnity-based insurance in that it features contracts written against a physical trigger (parametric insurance), such as rainfall measured at a regional weather station. These schemes may offer a viable alternative to traditional crop insurance, which has failed in many countries, mainly because of the high costs associated with settling claims on a case-by-case basis.

Index-based crop-insurance contracts are sold in standard units by rural development banks, farm cooperatives, or microfinance organizations, and the “premium” varies from crop to crop. As payouts are not

coupled with individual loss experience, farmers have an incentive to engage in loss-reduction measures, for example, by switching to a more robust crop variant.

Delivery models

Full-service model: Commercial or public insurers provide the full range of insurance services from the initial development of the product, through distribution, to absorbing the risk.

Partner-agent model: Commercial or public insurers, together with microfinance institutions or nongovernmental and other organizations, collaboratively develop the product. The insurer absorbs the risk and the agent markets the product through its established distribution network. This lowers the cost of distribution and thus promotes affordability.

Community-based model: Local communities, MFIs, NGOs, and/or cooperatives develop and distribute the product, manage the risk pool, and absorb the risk; there is no involvement on the part of commercial insurers.

Provider model: Banks and other providers of microfinance can directly offer or require insurance contracts. These are usually coupled with credit, for example, to insure against the risk of default.

Analysis

Microinsurance represents a financial instrument designed to protect the poor against risks, by using community-based mechanisms that are characteristic of developing countries. By offering a payout in critical situations, microinsurance has the potential to avoid costly ways of coping with losses.

The effects of microinsurance are heterogeneous across various studies but reviews also reveal that microinsurance seems to achieve markedly positive results under specific provisions. Our state of knowledge is still very incomplete and more systematic studies are still needed to precise the conditions under which the positive impacts occur. Tentatively, the three following conditions seem to prevail. First, the product design has to be adapted to the local needs of potential clients and particular attention should be given to the implementation on the field and the distribution channels used. Second, the reviewed evidence for insurance products highlights the importance of offering high-quality services, especially in the health care providers, in order to achieve the expected impacts. Finally, precise and practical information should be given to the beneficiaries to enable higher utilization rates.

The few cases where microinsurance has been implemented were either free or heavily subsidized or offering insurance along with other benefits such as subsidized credit and technical assistance. In extensively studied cases in Malawi (Gine & Yang, 2009) and India (Cole, et al., 2013), take up was only 20-30 percent with adopters hedging only a very small fraction of agricultural income. Take up among farmers not explicitly targeted in these programs was much lower. There are, however, recent exceptions, with Karlan et al. (2013) reporting a 40-50 percent take up at fair price plus a 50 percent loading in Ghana, and insurance inducing an

increase in investment in cultivation. In this case, experiencing insurance payouts either oneself or through social networks was an important determinant of demand. Low uptake remains a challenge in other cases.

Impact evaluations of index microinsurance focus on changes in ex-post shock coping or in ex-ante risk management. While few rigorous evaluations are available, results tend to show positive outcomes. Focusing on ex-post shock coping, Janzen and Carter (2019) show that access to IBLI, an index-based drought insurance for livestock in Northern Kenya, helps them reduce both asset smoothing and consumption smoothing, two key dimensions of self-insurance. Impact is selective according to wealth position. Poor households are less likely to have to destabilize their consumption in response to drought, while rich households are less likely to have to compromise their accumulated assets. Insured households are observed to be less dependent on food aid and other forms of assistance, indicating their better ability to cope with shocks. The use of insurance may also encourage investment in higher risk activities with higher expected profits.

The insurance market for individuals and businesses in the Pacific is served by 30+ companies (PFIP 2013). The bulk of PFIP's microinsurance focus has been on life insurance type products. The companies providing this product tend to be small; they have no independent financial security rating and pass on their high administrative costs to the consumer in the form of higher premiums. PICs are price takers when accessing insurance, as the market is small and has high exposure to catastrophic events relative to premium incomes. The mean penetration rate for Pacific countries for which data could be obtained was 1.6 percent (Lucas, 2015), which is considerably less than the rate in Australia (2.2 percent), half the rate of the European Union (3.1 percent), and about one-quarter the rate of the US (6.0 percent). Most of this insurance is concentrated in the commercial sector, with household insurance figures even lower.

Currently, only 1 percent of households and 3 percent of businesses in low- and middle-income countries, respectively, have insurance coverage against catastrophe risks, compared with 30 percent in high-income countries (Munich Re, 2005). Instead of insurance, the poor often rely on savings, depleting or mortgaging their land and assets, emergency loans from microcredit institutions, or money lenders. Alternatively, they rely on family support, which can be overwhelmed by catastrophes that affect people simultaneously throughout a region or country (referred to as covariant risk).

Finally, it is worth noting that migrants from the islands who are living and working in Australia, New Zealand or other developed countries play a critical role in smoothing consumption shocks after natural disasters. The Pacific Labour Scheme low-skill work visa program is a form of disaster risk insurance for the PICs. Data from around the world shows that remittances are a form of disaster insurance. Yang and Choi (2007) show that Filipino households with migrants use remittances to insure against negative weather shocks. Using worldwide data, Yang (2008) shows that remittances rise in response to hurricane damage in the home country, a form of disaster insurance.

5. Pacific Islands Schemes

There are several schemes that aim to develop insurance products and/or provide credit lines for the Pacific; many of these are described below. Four general observations from reviewing these schemes:

Demand: Overall, there is little to no discussion of demand from PIC governments. It is likely that many of the proposed insurance schemes will need to be subsidized for governments to afford them. Governments will also have to make choices across the various schemes. Demand will also be driven by the extent to which basis risk is addressed—if basis risk is high, governments are not likely to trust financial products over traditional forms of aid. It is important that donors find a way to assess demand and to be transparent about the level of demand.

Coordination: The Pacific Islands Forum Secretariat and other relevant entities must keep track of the various products and schemes as they start to lend money or sell insurance products. Several schemes have similar products and pooling of resources might be of more benefit than separately administered schemes. This point is recognized by some schemes, but in general, donor coordination is something that needs to be addressed.

Overall indebtedness: As countries access multiple sources of funds and credit lines, each must keep careful track of overall levels of indebtedness. The PIFS can play an important role here as well. For countries that are already heavily aid-dependent, the possibility of debt distress is very real.

Transparency: Several schemes mention developing products with the private sector and/or providing guarantees to private sector entities. These are welcome but donors and governments need to be transparent if public funds are being used for concessional financing or other subsidies to benefit private sector insurance companies or private firms. One option is for funds to be put into a trust; insurance contracts written against the money in the trust must be transparent in all aspects including premium costs, exposure and associated fees. Within a defined timeframe, if the scheme does not work out due to low demand or other factors, the fund can be liquidated, and the money returned to the donors.

Pacific Catastrophe Risk Financing and Insurance Initiative

PCRAFI is a multi-donor initiative that aims to provide Pacific Island Countries (PICs) with disaster risk modeling and assessment tools as well as integrated financial solutions to the challenges posed by natural disasters and climate change.³ PCRAFI helped lay the groundwork for the Pacific Catastrophe Risk Insurance Company (PCRIC), which is a captive insurance company (Devex, 2019). Also associated with PCRAFI is the Pacific Disaster Risk Assessment Project, which provides 15 countries with disaster risk assessment tools to help them model vulnerabilities related to natural disasters.

³ Description from the PCRAFI Website

Insurance to governments is provided through PCRIC which is headquartered in the Cook Islands. Currently, four countries are subscribed to PCRIC—the Cook Islands, Samoa, Tonga and the Marshall Islands. The Solomon Islands, originally a member, withdrew in the test phase.

Key components

Pacific Risk Information System (PacRIS): PacRIS is a platform that helps the PICs and their partners better understand and assess countries' exposure to natural disasters and provide unique and relevant information for their physical and financial management of natural disasters. This is to help build capacity and preparedness of PICs to predict and mitigate disaster risk. It has subsequently been used to inform urban planning as well as to support the development of the PCRAFI insurance program. PacRIS contains detailed, country-specific information on assets, population, hazards, and risks. The exposure database leverages remote sensing analyses, field visits, and country specific datasets to characterize buildings (residential, commercial, and industrial), major infrastructure (such as roads, bridges, airports, ports, and utility assets), major crops, and population. It also has a comprehensive regional historical hazard catalogue (115,000 earthquake and 2,500 tropical cyclone events) and historical loss database for major disasters. PacRIS is currently being updated.

Disaster Risk Financing: The Pacific DRF Program enables countries to increase their financial resilience against natural disasters by improving their capacity to meet post-disaster funding needs without compromising their fiscal balance. This program is built upon a three-tiered approach to disaster risk financing.

- i. Self-retention, such as a contingency budget and national reserves, to finance small but recurrent disasters;
- ii. A contingent credit mechanism for less frequent but more severe events; and
- iii. Disaster risk transfer (such as insurance) to cover major natural disasters. This insurance mechanism is modelled on the Caribbean Catastrophe Risk Insurance Facility (CCRIF, see next section) which has helped improved financial resilience for small island developing states in the Caribbean. The main features of this insurance scheme are as follows:
 - a. The DRFI allows participating countries to pool their country- specific risks into one, better-diversified portfolio.
 - b. Index-based (or parametric) insurance instruments pay claims based on the occurrence of a pre-defined event rather than an assessment of actual losses on the ground. This measurement, made remotely by an independent agency, allows for transparent, low settlement costs and quick-disbursing contracts.

Limitations of PCRAFI

Low demand: Only five of the fifteen eligible islands joined PCRIC; one of these (Solomon Islands) withdrew in the test phase. Currently, the four clients are the Cook Islands, Samoa, Tonga and the Republic of the Marshall Islands. It appears that Vanuatu will not be renewing its coverage through PCRIC; however, Fiji has recently joined the Council of Members. Creating demand for insurance products is an ongoing challenge, and not just for PCRIC. Premiums for insurance products are high and the quantum of payouts is low—PCRIC has made only three payouts—to Tonga in 2014 following Cyclone Ian (\$1.2 million), to Tonga again in 2018 after Cyclone Gita (\$3.5 million) and to Vanuatu in 2015 after Cyclone Pam (\$1.9 million).⁴

Affordability of premiums: It is difficult to expect countries that are heavily aid-dependent to invest in market-based insurance models and meet the high cost of insurance premiums. Optimism about the viability of a market-based model has given way to the realization that subsidies to premiums are likely to continue for some years. In 2017, the World Bank was optimistic about moving to a market-based model where premiums would be paid by the member countries of PCRIC. But it was also cautious about their ability to finance their premiums, saying that “market-based catastrophe risk insurance solutions are very new for the PICs and mark a major shift in the public financial management of natural disasters” and that “their ability to finance their premium remains a challenge moving forward” (World Bank, PCRAFI Project Appraisal Document, February 2017).

Premiums are currently financed by IDA to the tune of \$500,000 per year for each of three countries--the Marshall Islands, Samoa and Tonga. Each pays about \$60,000 each from their national budgets. The Cook Islands pays the full premium of \$100,000 from its own funds. PCRIC was initially structured so that premiums were subsidized for three years by IDA; in FY19, additional IDA funds were secured to pay premiums for five years, with the goal of progressively increasing contributions from governments. PCRIC is currently capitalized at \$24.8 million. Table 4 lays out the full schedule of payments and coverage for the current season. Of the \$1.78 m in premiums, \$1.5 million is covered by IDA.

⁴ The point about premiums being high is about affordability rather than pricing – pricing is determined by a hazard model which suggests a certain frequency of loss, the PIC picks the premium level and the insurance provider calculates the exposure that can be bought for that amount. Most insurers use hazard models to estimate premiums. For pricing, the main issue is how high the risk is estimated to be vs what PIC’s think it is (and given the lack of detailed modelling in the region given its scale – there is no guarantee the hazard model is not conservative).

Table 4. Estimated premium payments and coverage limits of PCRIC

Country	Event	Premium	Average annual loss(US\$)	Attachment point (US\$)	Coverage limit (US\$ m)
Marshall Islands	Tropical Cyclone	560,000	414,815	780,000	10.20
Samoa	Cyclone	369,600	273,778	2,624,000	9.73
	Earthquake/ tsunami	190,400	141,037	1,106,000	5.98
Tonga	Tropical Cyclone	280,000	207,407	4,806,000	3.53
	Earthquake/tsunami	280,000	207,407	724,000	3.85
Cook Islands	Tropical Cyclone	100,000	74,074	1,571,000	3.03
TOTAL		1,780,000	1,318,519		36.32

Source: World Bank (2019)

Limits of parametric triggers: Although parametric triggers allow for rapid claims settlement, they lack the flexibility of softer triggers (like a declaration of natural disasters by the national or local government). Parametric triggers limit the ability of PICs to claim damages from disasters that are costly but just below the trigger criteria. In 2015 the Solomon Islands pulled out of PCRIC due to the lack of payouts after two natural disasters. Parametric triggers were set too high to enable a payout in the aftermath of an earthquake in 2013. The Solomon Islands were again deemed ineligible after flooding due to heavy rains in 2014; a payout was not possible because the flooding was unrelated to a cyclone. PCRIC covers cyclones while excess rainfall is sometimes the greater problem in the Solomon Islands, the Marshall Islands and other places. All countries weigh the cost of insurance relative to the benefits; if the latter are perceived to be low or non-existent, it is unlikely that countries will continue their participation.

All disaster losses are not covered: The DRF is not designed to cover the government against all disaster losses; instead, it is intended to cover some portion of the losses from major disasters of certain types. Therefore,

there may be a difference between expectations and outcome; this type of basis risk is difficult to manage but must be identified and quantified to manage expectations and preserve demand for insurance products.

Logistical constraints and donor reset: PCRIC is based in the Cook Islands, and functions under a captive insurance license. PCRIC is structured as a special purpose vehicle, authorized by the government of the Cook Islands, in order to function as a multi-jurisdictional entity. PCRIC has had some challenges—in its four years of existence, it has had a CEO in place for only 10 months. A board has recently been put in place and a new board chair has been appointed. In 2019, the four major donors of PCRIC—the United States, the United Kingdom, Germany and Japan--decided to do a reset of the entire project. In connection with this, the World Bank is currently carrying out a mid-term review with a view to restructuring the company to provide a wider range of products. Simultaneously, PCRIC is also exploring a “segregated cell” model, in collaboration with the Asian Development Bank and the World Bank, that would enable it to provide disaster risk financing and insurance to private entities.

Traill et al (2019) note that PCRIC has faced challenges in presenting itself as a comprehensive solution. However, part of the issue is that PCRIC has only operated as a company for three seasons, and only had a CEO for 10 months and a full governance board for six months. Traill et al are hopeful that PCRIC will be able to “refresh its strategic priorities” and particularly focus on becoming a segregated cell company in order to accommodate new portfolios (such as pilot portfolios in excess rainfall, mutual insurance funds, and climate change-based insurance) without risking existing capital. The Cook Islands will need to review and pass legislation to establish a segregated cell company and other regulatory and supervisory controls. PCRIC is currently at work on product development for an excess rainfall index which will be a valuable addition to its portfolio of activity.

Pacific Financial Inclusion Programme (PFIP)

Jointly administered by the United Nations Capital Development Fund and the United Nations Development Programme, PFIP, which began in 2014, aims to help low-income Pacific Islanders access financial services and financial education. It does this by helping financial services providers develop innovative products and services for mass-market consumers, supporting governments to create an environment that enables such innovation and empowers consumers (UNDP, 2019). PFIP has historically engaged with the private sector with a focus on mobile banking and life insurance products. It has only recently entered the market for disaster insurance. Traill et al (2019) suggest that PFIP’s product line be enhanced by working with Pacific private insurance companies to ensure that products are “sustainable and support risk reduction investment as well as sustainable levels of coverage.”

PFIP is currently conducting a feasibility study in partnership with the Munich Climate Insurance Initiative to determine whether a product like the Caribbean Livelihood Protection Plan, which aims to cover financial losses, while helping with repairs to low-value assets, might be helpful for communities in Tonga. PCRIC is also being considered as a possible facility for the product. The feasibility study also allows for PFIP to accelerate its Disaster Resilience for Pacific Small Island Developing States (RESPAC) program and in the

course of this review, get a clearer idea of micro-insurance needs for disaster damage and livelihood protection.

Pacific Resilience Facility (PRF)

Discussed and approved during the 2018 Economic Ministers Meeting of the Pacific Islands Forum (FEMM), the PRF aims to help finance resilient infrastructure and strengthen strategic partnerships with donors and development partners, while also building capacity in terms of national disaster risk budgeting and financing (Delia, 2018). The PRF is a fairly new initiative that is under development, as seen in a published tender ending on November 2018 for companies to carry out technical work such as designing products (2018).

The goal of the PRF is to establish a regional facility to coordinate and channel investment opportunities, and to build linkages between regional organizations and risk pools. The PRF offers an opportunity for closer links between regional product development, including insurance products and other forms of financing for reconstruction.

A structure has been proposed for the PRF, based on consultations with stakeholders from government, private sector, and community groups/civil society organizations (CSOs). Initially capitalized through member contributions and other sources, the PRF aims to grow its capital base over time through income from investments and further contributions from members or donors to become a grant-making facility. It will be governed by a Council of Members, a Board, and a management team.

Traill et al (2019) argue that the PRF represents an opportunity to connect project financing and insurance, so that assets financed by the PRF are also protected from disasters. Projects funded by the PRF would need to be linked to a national infrastructure development plan and satisfy PRF requirements for climate preparedness.

Pacific Islands Climate Change Insurance Facility (PICCIF)

Discussed during the 2018 FEMM, PICCIF did not however acquire the resources necessary for it to be launched; it is expected that Tuvalu will propose it during the August 2019 meetings as a country initiative. Since 2018, a taskforce has sought to develop the concept further and identify funding partners, and it is expected that a funding agreement will be signed (the report is from April 2019, so it is not clear if such an agreement was reached). PICCIF is associated with the government of Tuvalu, which first proposed it, and is designed to insure against challenges related to climate change beyond disaster risk (such as slow-onset and extreme weather events) and generate financing for climate change insurance (Pacific Island Forum Secretariat, 2019).

Pacific Resilience Programme (PREP)

Run by the World Bank and funded through IDA, PREP is a series of projects aimed at strengthening PIC resilience to natural disasters through working on areas such as early warning and preparedness; retrofitting public assets to meet international standards on resilience; creating a framework for “smarter investment in resilience activities”; and promoting financial resilience through providing an immediate post-disaster cash injection to help recovery (World Bank, 2015). This cash injection provision was part of the consolidation of PCRAFI and other relevant World Bank projects under the Pacific Resilience Plan, also abbreviated as PREP, which I believe may be the same project, and which is referenced in a World Bank factsheet on PCRAFI II. When it was launched in 2016, it began work on improved early warning systems for Tonga and Samoa and preparing tools to promote PIC financial resilience (PCRAFI, 2016). The World Bank is investigating the possibility of adding drought and volcano related topics to their early warning systems projects under PREP and PCRAFI.

Pacific Disaster Resilience Programme (PDRP)

PDRP, which was launched by the Asian Development Bank in 2017, provides policy-based loans and grants, as well as technical assistance, to PICs. This is designed to both provide a quick-disbursing, predictable source of financing for post-disaster recovery, as well as to assist countries with undertaking priority actions related to disaster risk management. One of the stated goals of PDRP is to address challenges that might require resources greater than those available in emergency funds, but which are not covered cost-effectively by insurance. It also aims to promote regional collaboration and experience sharing between PICs (Asian Development Bank, 2017). The program began with Samoa, Tonga, and Tuvalu, and a second phase has been proposed, adding four more countries and replenishing disaster contingent financing for Tonga (Asian Development Bank, 2019).

PDRP currently offers a contingent credit product funded by national and regional development grants that operates like a Contingent Emergency Resource Component (CERC), the ADB would like to direct these funds into a regional savings fund to allow for greater donor engagement. This fund would likely be located at PCRIC (or possibly PRF). However, the delays in PCRIC establishing segregated cell structures have prevented this fund from being established; the Cook Islands is yet to draft the necessary legislation. Finally, PREP and PDRP have considered mutual fund products such as a mutual insurance fund or a mutual savings fund, which could be funded through PCRAFI, PREP, or possibly PDRP.

Drua Incubator

Launched by the Government of Fiji in 2017 with initial funding from the Government of Luxembourg, the Pacific Climate Finance and Insurance Incubator (also known as the Drua Incubator) aims to bring together prominent figures in banking and finance to develop new financial products that are appropriate for PICs and Pacific Island communities dealing with the effects of climate change. In doing so, it seeks to address the fact that many existing products have excessively stringent compliance requirements, making them unaffordable

for PICs. Drua aims to develop more affordable sources of insurance, including for the agricultural sector which is facing the brunt of climate change (COP23 Fiji, 2017).

The Pacific Islands Forum Secretariat already plays a critical role in promoting regional cohesion across all of these initiatives. It will be necessary for the PIFS to bring clarity to the various different projects such as PCRAFI, PRF, PICCIF, Drua and others.

Fiji Effective Householders Protection

In the aftermath of devastating cyclones (TC Winston and TC Gita), the Fiji government has explored the possibility of insuring the housing stock. The challenge is to insure housing that is not resilient; the lower quality of construction has meant that traditional insurers have not been attracted to the market. The World Bank and the International Finance Corporation, together with the Fiji government, is looking at developing two household products—a parametric based household insurance product (“the livelihood product”) and a household indemnity product (“the bronze product”). Fiji has recently become a member of the Council of Members of PCRIC and PCRIC may play a role by providing reinsurance for both products.⁵ For the latter, PCRIC will need to obtain approval to change its structure to a segregated cell company.

Pilot Programme for Climate Resilience (PPCR)

PPCR, which is a program of the Strategic Climate Fund, one of the two funds in the Climate Investment Funds framework, was made operational in 2008 and provides funding for technical assistance for countries to incorporate climate resilience into national development plans, as well as funding for public or private investments identified in national or sectoral development plans. Participating countries must be ODA-eligible and have active MDB country programs, with preference given to highly vulnerable countries eligible for concessional funds, such as Small Island Developing States, which includes several PICs (Pilot Program for Climate Resilience, 2012). Unlike many of the other projects here, this is not Pacific-specific, although a Pacific regional program does exist within the framework.

Private Sector Development Initiative (PSDI)

A technical assistance program run by the Asian Development Bank since 2006 with the aim of improving the business environment in Pacific Developing Member Countries, PSDI is currently in its third phase. The current phase is particularly focused on “competition policy and the economic empowerment of women”; previous phases emphasized “business law reform”, “improving access to financial services”, and reform of state-owned enterprises and public-private partnerships (Asian Development Bank, 2013). Unlike the other

⁵ PCRIC has provided a quote for premiums to the Government of Fiji for the livelihood product; the government has indicated that it will not be able to purchase coverage until the next financial year. Technical design for the bronze product is ongoing.

projects here, this is not disaster or climate change specific, although its activities are likely relevant to those issues.

Pacific Resilience Partnership (PRP)

Associated with the Pacific Islands Forum, to which it reports, the PRP was established in 2017 and designed to bring together stakeholders in climate change, disaster risk management, and sustainable development to support the implementation of the Framework for Resilient Development in the Pacific. The PRP aims to facilitate experience-sharing, promote linkages between all levels of implementation, promote regional cooperation, support monitoring and evaluation, and identify and address gaps and strengthen linkages relating to other climate policy frameworks such as the Paris Agreement on Climate Change. A key goal of the PRP is to involve a variety of groups promoting resilience, not just government stakeholders (Pacific Resilience Partnership, 2017).

International Federation of Red Cross and Red Crescent Societies (IFRC) Climate Center

Traill et al (2019) points to the fact that the IFRC climate center has been a pioneer in terms of using forecast-based financing, which uses parametric triggers to open an ‘anticipatory window’ into the emergency fund for national Red Cross societies. While the IFRC has not been very involved in the Pacific region, it appears that a working group is being established around forecast-based financing.

Fiji Early Pension Withdrawal Scheme

In the wake of Cyclone Winston in 2016, the Fiji government allowed pre-retirement pension withdrawals as a way to smooth consumption and rebuild assets. Pension fund members were allowed to withdraw up to F\$6000 as long as it was within the cumulative cap on withdrawals of 30 percent of the total. About 180,000 applications were approved and the average amount withdrawn was F\$1510 (US \$750).

A recent paper by the IMF evaluates this action in light of a life-cycle savings model with myopic households facing large shocks from natural disasters. The IMF model highlights the tradeoff between building up sufficient retirement savings and ensuring access to savings in the aftermath of a disaster (Guo and Narita IMF, 2018). The authors make an interesting observation—pension funds can be usefully used if the early withdrawal scheme is carefully managed. In other words, if the withdrawal amount is not too generous, a one-time early withdrawal can improve welfare. It can also reduce the burden of precautionary savings. Finally, the authors argue that the welfare costs of increasing the mandatory contribution is low and there might be room to increase the rate of mandatory contribution. However, it is worth noting that Fiji’s mandatory contribution rate is the highest in the region.

There is scope to broaden this scheme. Most Pacific Islands countries have national defined contribution pension schemes. Vanuatu has also allowed early withdrawals; in the aftermath of Cyclone Pam, 40,000 members were allowed to withdraw up to 20 percent of their retirement savings. The success of these

schemes will lie in recognizing the tradeoff between retirement and consumption-smoothing, as highlighted in the IMF paper and in managing expectations around what is possible in the aftermath of a natural disaster.

World Bank Catastrophe Deferred Drawdown Option (CAT-DDO)

In order to develop and enhance the capacity of developing countries to manage natural hazard risks the World Bank has recently introduced a new cost-efficient emergency relief instrument; a Development Policy Loan with a Deferred Drawdown Option for Catastrophe risks (Cat DDO). This contingent financing line that provides immediate liquidity to countries to address shocks related to natural disasters and serves as early financing while funds from other sources such as bilateral aid or reconstruction loans are being mobilized (World Bank, 2018).

Funds become available for disbursement after the drawdown trigger – typically the member country’s declaration of a state of emergency – is met. The Cat DDO instrument requires a country to improve its ex-ante disaster preparedness by putting into place an country macroeconomic policy framework and disaster risk management program (IPCC, 2018). The World Bank periodically monitors a country’s compliance to ensure the cost of future disasters is contained. Cat DDO programs have been successfully implemented in Colombia and Costa Rica but it remains to be seen how effective these would be in the Pacific setting. Recently Samoa has revised building codes and improved its multi-hazard systems in preparation for a Cat DDO instrument (GFDRR, 2017).

Global Risk Financing Facility

The Global Risk Financing Facility (GRiF) is a new initiative which plans to “strengthen financial resilience of vulnerable countries by enabling earlier and more reliable response and recovery to climate and disaster shocks, and over time to a wider range of crises, through establishing or scaling up pre-arranged risk financing instruments, including market-based instruments like insurance. It will focus on helping poor and vulnerable people, and the economy, services and infrastructure they depend on, to recover more quickly when a disaster strikes.”

GRiF will be supported by and build on the work of existing programs, including the InsuResilience Climate Risk Financing and Insurance Program MDTF jointly established by BMZ, DFID and the World Bank, the Centre for Global Disaster Protection jointly established by DFID and the World Bank, and InsuResilience Solutions Fund jointly established by BMZ and KfW. These programs currently form the Program Alliance of the InsuResilience Global Partnership.

Activities to be financed by GRiF include:

1. insurance premium financing, e.g., for the payment of risk transfer instruments;
2. contingent financing, e.g., through the provision of concessional credits to complement risk transfer solutions;

3. risk financing investments, e.g., investment in start-up or operating costs and capital for risk pools;
4. integrating risk transfer with loans to pilot new approaches to support debt sustainability in the face of extreme events;
5. risk financing mechanisms that promote parallel improvements in country systems for crisis response and recovery;
6. technical assistance and capacity building where this is not yet covered by other programs.

GRiF will be implemented by the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR) and select implementing partners. GRiF funding will be channeled through the World Bank or select implementing partners such as regional development banks. GRiF plans to work with PCRAFI/PCRIC and other regional initiatives in the Pacific.

6. Other Relevant Insurance Schemes for the Pacific Islands

Several schemes outside of the Pacific region are worthy of review. Many of these are being implemented in countries that are very different than the Pacific Islands. However, there are elements in each of the schemes described below that may be of relevance to disaster risk finance in the Pacific Islands. The best functioning scheme is probably the Caribbean Catastrophe Risk Insurance Facility (CCRIF).

Caribbean Catastrophe Risk Insurance Facility⁶

CCRIF SPC is a segregated portfolio company, owned, operated and registered in the Caribbean. It limits the financial impact of catastrophic hurricanes, earthquakes and excess rainfall events to Caribbean and—since 2015—Central American governments by quickly providing short-term liquidity when a parametric insurance policy is triggered. It is the world's first regional fund utilizing parametric insurance, giving member governments the unique opportunity to purchase earthquake, hurricane and excess rainfall catastrophe coverage with lowest-possible pricing.

In 2007, the Caribbean Catastrophe Risk Insurance Facility was formed as the first multi-country risk pool in the world and was the first insurance instrument to successfully develop parametric policies backed by both traditional and capital markets. It was designed as a regional catastrophe fund for Caribbean governments to limit the financial impact of devastating hurricanes and earthquakes by quickly providing financial liquidity when a policy is triggered.

In 2014, the facility was restructured into a segregated portfolio company (SPC) to facilitate expansion into new products and geographic areas and is now named CCRIF SPC. The new structure, in which products are

⁶ This description of CCRIF is taken directly from its website.

offered through a number of segregated portfolios, allows for total segregation of risk. In April 2015, CCRIF signed an MOU with COSEFIN - the Council of Ministers of Finance of Central America, Panama and the Dominican Republic - to enable Central American countries to formally join the facility.

CCRIF SPC is registered in the Cayman Islands and operates as a virtual organization, supported by a network of service providers covering the areas of risk management, risk modelling, captive management, reinsurance, reinsurance brokerage, asset management, technical assistance, corporate communications and information technology. CCRIF offers earthquake, tropical cyclone and excess rainfall policies to Caribbean and Central American governments.

CCRIF helps to mitigate the short-term cash flow problems small developing economies suffer after major natural disasters. CCRIF's parametric insurance mechanism allows it to provide rapid payouts to help members finance their initial disaster response and maintain basic government functions after a catastrophic event.

Since the inception of CCRIF in 2007, the facility has made 38 payouts to 13 member governments on their tropical cyclone, earthquake and excess rainfall policies totalling almost US\$139 million. Also, CCRIF has made 7 payments totalling almost US\$700,000 under member governments' Aggregated Deductible Cover (ADC).

The ADC is a new policy feature for tropical cyclone and earthquake policies introduced in the 2017/2018 policy year. The ADC was designed to be akin to a dedicated reserve fund providing a minimum payment for events that are objectively not sufficient to trigger a CCRIF policy, because the modelled loss is below the attachment point.

CCRIF was developed under the technical leadership of the World Bank and with a grant from the Government of Japan. It was capitalized through contributions to a Multi-Donor Trust Fund (MDTF) by the Government of Canada, the European Union, the World Bank, the governments of the United Kingdom and France, the Caribbean Development Bank and the governments of Ireland and Bermuda, as well as through membership fees paid by participating governments.

In 2014, another MDTF was established by the World Bank to support the development of CCRIF SPC's new products for current and potential members, and facilitate the entry for Central American countries and additional Caribbean countries. The MDTF currently channels funds from various donors, including: Canada, through Global Affairs Canada; the United States, through the Department of the Treasury; the European Union, through the European Commission; Germany, through the Federal Ministry for Economic Cooperation and Development and KfW; and Ireland. In 2017, the Caribbean Development Bank, with resources provided by Mexico, approved a grant to CCRIF SPC to provide enhanced insurance coverage to the Bank's Borrowing Member Countries.

Nineteen Caribbean governments are currently members of the facility: Anguilla, Antigua & Barbuda, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, Montserrat, St. Kitts & Nevis, Saint Lucia, Sint Maarten, St. Vincent & the Grenadines, Trinidad & Tobago and Turks & Caicos Islands. Two Central American governments are currently members of the facility: Nicaragua and Panama.

Africa Risk Capacity (ARC) Replica

The African Risk Capacity (ARC) provides index insurance against droughts to African Union member states. As a distinctive feature of ARC, participating governments have to prepare contingency plans prior to taking out insurance. These plans determine how insurance payouts will be used when the insurance is triggered. By combining early warning and contingency planning with an insurance mechanism, ARC provides liquidity shortly after a catastrophic event, while the pre-planned activities ensure that payouts are used quickly and effectively, mitigating the detrimental impacts of disasters for the poor and vulnerable. Currently, ARC is developing two new insurance products against floods and tropical cyclones.

ARC is piloting a new financing instrument – the Africa Risk Capacity (ARC) Replica – an insurance mechanism designed to release funds early, quickly and predictably in humanitarian emergencies.

This financing instrument is underpinned by:

- Science-based risk modelling to understand the emergency in areas of operation;
- Contingency planning aimed at mitigating the impact of disasters on vulnerable communities; and
- Pre-positioned funding for immediate humanitarian response.

As an insurance risk pool, ARC's objective is to capitalize on the natural diversification of weather risk across Africa, allowing countries to manage their risk as a group in a financially efficient manner in order to respond to probable but uncertain risks. These techniques, while not new, can be applied by African countries in innovative ways to lower the cost of the response to disasters, before they become humanitarian crises, and provide better services to those affected.

The initial capital comes from participating countries' premiums as well as one-time partner contributions. ARC works with countries to calculate country premiums and allocate payouts to member countries based on predetermined and transparent rules for payment. Countries select the level at which they wish to participate by selecting the amount of risk they wish to retain and financing they would want from ARC for droughts of varying severity. (ARC will provide coverage for other hazards, including floods, at a later date.)

Operations plans, which are meant to optimize ARC disbursements, are a prerequisite for participation and take into account existing mechanisms, priorities and needs of each participating government. These plans are

evaluated by the ARC Board's Peer Review Mechanism according to standards set by the Conference of the Parties. The pool reinsures itself as well as benefits from investment income so that builds and protects the capital available for coverage to member governments.

The Turkish Catastrophe Insurance Pool

The recently launched TCIP is the first of its kind to tackle the problem of insurance affordability in a middle-income developing country and couple it with incentives for disaster prevention. The city of Istanbul faces an estimated 0.41 probability of a severe earthquake over the 30-year period from 2004 to 2034 (Parsons, 2004).

In response to this risk, earthquake insurance policies are now obligatory for all urban property owners, who pay a fee based in part on their risk-reduction measures, such as retrofitting their apartment buildings, to a privately administered, public fund. In effect, there is now a partnership between the government and the private sector in providing security for earthquake risks throughout the country.

This partnership extends beyond the government and the private insurance market to include an international financial institution. To reduce premiums and make the system viable, the World Bank provides support by reinsuring two layers of the TCIP risk in the form of a contingent loan facility with highly favorable conditions and contingent on the occurrence of a major disaster (Gurenko, 2006). Arguably, without this low-cost reinsurance, the premiums would not be affordable for many in this middle-income developing country. This insurance scheme highlights the role of the World Bank in subsidizing insurance schemes in developing countries.

The Andhra Pradesh disaster microinsurance scheme (India)

In India's coastal Andhra Pradesh region, microinsurance services are provided since 2004 as part of the region's disaster preparedness program. Life insurance policies that include natural disaster risks are offered to vulnerable families by the Oriental Insurance Company, a profit-oriented, but publicly owned insurer. Coverage for risks of floods, landslide, rockslide, earthquakes, cyclone, and other natural calamities is available to groups of women in the age of 10–75 years and with a minimum size of 250 members. The premium ranges between 100 and 150 Rupees (approximately 2–3 Euro) (Krishna, 2005).

Insurance premiums are kept low by offering only minimal cover and dealing with organized women groups, thus limiting transaction costs. Still, to help the operation get underway, the international NGO Oxfam UK paid 50 percent of the premium in the first year. Insurers have also made insurance affordable to poor communities with cross subsidies from their other lines of business and wealthier clients in order to meet government regulatory standards.

Contributing even further to the low premium, additional support for the system comes from OXFAM-trained village disaster management volunteers, who act as insurance agents by carrying out contract preparation and claims handling and thus lowering transaction costs even further. Coverage under this

scheme is extended currently to more than 1000 vulnerable families, and since 2002 more than 80 insurance claims have been reported and settled, including damages to property from natural events (Krishna, 2005). However, there have been no major catastrophes in the insured region. It should also be kept in mind that this is only a small pilot system. Scaling up would put more stress on the program, requiring considerably more backup capital or reinsurance.

Proshika and the Participatory Livestock Compensation Fund (Bangladesh)

One of the largest NGOs and MFIs in the world with more than 2 million clients, Proshika offers the Participatory Livestock Compensation Fund (PLCF). The PLCF was introduced in 1990 and covers the loss caused by sudden death of farm animals and poultry, specifically cattle, goats and chickens. Each group of borrowers contributes 3 percent of the purchase value of the animals to this fund and in case of death the whole purchase value is compensated. This scheme experienced wide-scale defaults during the 1988 massive floods that affected 73 million people, more than half the population of Bangladesh (CRED, 2007). As a response to the disaster, in 1991 a natural disaster management program was established, and since 1997 compulsory group-based insurance is included. Under this program 2 percent of the savings balance is annually transferred to a fund, which will pay twice the amount of the savings deposit in the case of property damages due to disasters, while savings stay intact. In the life policy component, a minimum of twice the savings balance will be paid out depending on the years of membership in the savings scheme -- the outstanding loan will be recovered (ILO, 2005). With more than two million clients in 20,000 villages and 2000 slums in 57 districts of the country, this insurance fund has wide geographic diversification. The experience of the Proshika scheme and similar other programmes have led many observers to recommend the partner-agent model, where commercial insurers play an important role (Linnerooth-Bayer & Mechler, 2007).

Afat Vimo (India)

Since 2004, an NGO called the All India Disaster Mitigation Institute (AIDMI) has been offering a disaster insurance program, Afat Vimo, covering households and small businesses for 19 different types of disasters, including floods, earthquakes, cyclones, fires and riots. Currently covering 6,000 clients—mostly men and women running small enterprises—it is planned to upscale the scheme to cover an additional 10,000 people in the next few years. The scheme is backed by two public insurance companies which collaborated closely with AIDMI in designing the product, setting premiums, determining cover and underwriting the risk.

On average, premiums are approximately 0.5 percent of the clients' annual income. They are kept affordable by relying on voluntary help from the NGO administering the Livelihood Relief Fund (LRF) and support from donors in the form of post-disaster and post-conflict interest-free loans to assure solvency. Because of

the pro-poor regulatory requirements in India, the public insurers also subsidize premiums of their low-income clients from insurance in more lucrative markets. Finally, premiums are kept affordable by limiting cover, leading some observers to claim that the main benefit of Afat Vimo has been to limit the debt that can quickly arise out of a disaster, but not necessarily to provide the poor with needed capital to fully restore their livelihoods (Vaux 2007).

Index Based Flood Insurance Pilot (Bangladesh)

A pilot project launched in 2013 in one district in Bangladesh provides flood insurance based on water levels and a hydrodynamic model. Households pay a premium of BDT 824 (USD 10) plus VAT. Floods above predetermined water levels lasting more than 10 days trigger compensation payments of BDT 2,800 (USD 36) per household, increasing to a maximum of BDT 8,000 (USD 100) for floods of 26 or more days. The pilot program covers 1,661 households in 14 villages. The program is designed to distribute payments quickly and to reduce the possibility of human error or tampering (Oxfam, 2013; Oxfam Bangladesh, 2013; Swiss Re, 2013).

The program was initiated by Oxfam, funded by the Swiss Agency for Development and Cooperation, and is jointly implemented by CIRM Advisory Services (India), Institute of Water Modelling (Bangladesh), Pragati Insurance Ltd. (Bangladesh), Swiss Re, Manab Mukti Sangstha (Bangladesh) and Palli Karma Sahayak Foundation (Bangladesh) (Oxfam Bangladesh, 2013). In 2014, the first pay-out from the program was made to 700 households. Floods in August and September 2014 caused significant damage in several villages, and compensation was paid on 31 October (Swiss Re, 2014; Oxfam, 2014).

Hurricane-Resistant Home Improvement Program (St. Lucia)

In 1996 the St. Lucia charity, National Research and Development Foundation (NRDF), with assistance from USAID/OAS and CARITAS, established a home improvement program offering loans for affordable new or improved existing housing to low-income homeowners, while providing for physical and financial protection against natural disasters. Within this Hurricane-Resistant Home Improvement Program (HRHIP), minimum building standards were developed for reference by homeowners, and builders and local builders were trained in safer construction. The services of a trained building inspector were also offered to approve materials for use in retrofitting and to check whether minimum standards were being observed. Furthermore, a group insurance plan, underwritten by a Caribbean subsidiary of a United Kingdom-based insurance company, was established through a St. Lucia broker. The insurance plan covered major natural disasters such as windstorms, earthquake, floods and sea surge, and volcanic eruptions. Membership of the insurance scheme was mandatory for recipients of the home improvement loans. Full coverage with a deductible of 2 percent was specified in the policies. Premium rates ranged from 0.60 percent for concrete block homes to 1.05 percent for homes made of timber. The insurer trained NRDF project officers in property valuation and accepted these exposure estimates.

Between 1996 and November 2002, 345 loans were disbursed within this program, with an average loan size of EC\$11,000 (approximately US\$4,100 in 2002). The majority of these loans (68 percent) were either for extensions to existing structures or for new structures. The remainder of the loans were for repairs and renovations, purchase, or relocation of homes. No claim was reported by the scheme, as no major event with substantial losses hit the country. The program was discontinued in 2002 when the insurance broker went into liquidation; it was revealed that the insurance premiums had not been passed on to the insurer, causing the contracts to lapse. Efforts are currently under way to revive the insurance scheme (OAS, 2003a; OAS, 2003b).

PT Asuransi MAIPARK (Indonesia)

In Indonesia, the government has legislated to require industry cooperation in a reinsurance scheme for earthquake risk. Concerns about whether insurers would be able to pay claims in the event of a large earthquake led to the creation of a national reinsurance company, PT Asuransi MAIPARK, in 2003. All non-life insurance and reinsurance companies operating in Indonesia are shareholders of the company, which is operated by the industry. Premiums are charged based on property type and location. Insurance cover is provided as an extension of standard fire policies. MAIPARK also supports research, public education, and risk mitigation activities such as supporting work towards safer construction standards and building codes (OECD, 2015a; MAIPARK, 2015).

Europa Re (South-Eastern Europe)

Europa Re is a private reinsurance company established in 2010 to increase access to catastrophe insurance for households and small and medium enterprises in southeastern Europe. It aims to provide reinsurance for both indemnity and parametric insurance products as well as technical assistance to insurance companies in the region (Europa Re, 2015a). In November 2015, the company launched online sales of earthquake insurance in Albania through a local insurance partner, with expansion to Serbia and Macedonia planned (Europa Re, 2015b).

Europa Re is owned by the governments of Albania, Serbia, and the Former Yugoslav Republic of Macedonia. It was established with support from the World Bank, the Global Environment Facility, the Swiss Secretariat for Economic Affairs, and UNISDR Europe (OECD, 2015a). The company is based in Switzerland (Europa Re, 2015a).

Flood Re (United Kingdom)

In the UK between 2000 and 2013, flood insurance has been available to households in high-risk areas due to voluntary agreements negotiated between the government and insurance providers, under which, at-risk properties could be insured as long as the government's Environment Agency had plans in place to defend vulnerable areas (OECD, 2015a). These voluntary agreements will be replaced by a reinsurance scheme which is to begin operating in April 2016. Flood Re is a not-for-profit flood reinsurance fund managed by the

insurance industry. It will have statutory powers intended to help improve affordability of flood insurance in areas at risk. It will impose an industry-wide levy of GBP 180 million (USD 270 million) per year and provide reinsurance cover to the industry. However, over the next 25 years it is intended that risk mitigation measures be strengthened, and that the industry should transition to fully risk reflective pricing for flood insurance (Flood Re, 2015).

MicroEnsure (multi-country)

MicroEnsure works with partners across the insurance value chain to develop and deliver affordable insurance solutions. It tailors its role depending on the needs of its partners, but broadly plays three key roles.

First, MicroEnsure analyzes a country's market for microinsurance. It then identifies insurance and reinsurance companies and brings them on board to bear the risk of insuring customers. Second, MicroEnsure mobilizes distribution partners— companies and organizations with high levels of trust among the poor—to get insurance into the hands of customers. Third, MicroEnsure provides integrated back-office services to its insurance and distribution partners, including product design and marketing, risk selection, underwriting, and pricing.

MicroEnsure mainly subsidizes small-scale farmers but has slowly started introducing disaster insurance as part of its portfolio. A pilot project in Ghana aims to insure small businesses against fires and other disasters.

7. Conclusion

The PICs are inherently prone to frequent, large natural disasters. The cost of dealing with the aftermath of these disasters requires either setting aside large sums of national income in good years or large sums of external support. Given existing levels of dependence on aid, donors will likely have to pick up some of these costs whatever the mechanism.

Currently, donors meet costs mostly in the form of disaster relief after the event. This has advantages in that the money goes where it's needed, its disbursements can be supervised, etc. But it also incurs costs--mostly delays and uncertainty in disbursing money when a disaster happens. Insurance can help to address some of these problems by smoothing out payments by donors and PIC governments, but there is also uncertainty about when and how the insurance pays out. It is important for donors to assess demand for insurance products and to be transparent about the cost of insurance contracts and related exposure to disasters.

The unique circumstances of PICs suggest that premiums will need to cover payouts and as payouts are expected to be large, premiums will also be large. Donors will need to subsidize premiums just as they now subsidize payouts. It is therefore a mistake to characterize insurance schemes as market-based financing.

Donors can assist governments to reduce risk by increasing resilience to shocks. This would entail improving the quality of infrastructure, building codes etc. This may also translate into lower expected payouts (and

hence lower insurance premiums). Indeed, a well-designed insurance scheme may be able to incentivize countries to undertake the preparatory work that would increase resilience, by linking premiums to the degree of resilience preparedness.

Donors and governments must invest in understanding the benefits of the various types of disaster risk finance and optimize across the available portfolio of products and delivery methods while recognizing that different communities or industry segments may benefit from these products in different ways. Investments in data and in data sharing arrangements will go a long way towards maximizing the returns to disaster risk products.

Even as donors and governments invest in the various schemes described in this paper, it will be essential for a regional body such as the Pacific Islands Forum to keep track of overall levels of indebtedness and encourage all actors to minimize duplication and administrative costs. Debt distress is a real possibility for a region that is already heavily dependent on aid.

There may be political economy considerations for both PICs and donors to go the private insurance route (rather than the direct payout route) but these need to be explicit and carefully costed. This is especially the case if public funds are being directed to private companies and/or used to subsidize private insurers or their clients. As with all public-private partnerships, the design of the scheme has to align incentives, be transparent about costs and benefits, and promote competition among private providers to maximize value for money for public resources.

Appendix 1. Tropical cyclones in the South Pacific, 2010-present

Tropical cyclones are measured on a yearly basis (each year is a season). The South West Pacific region (where the PICs lie) is one of seven divisions in which tropical cyclones are measured..

Season	Total TC's	Strongest storm	Deaths	Damages (USD)
<u>2010–11</u>	7	<u>Wilma</u>	4	\$25 million
<u>2011–12</u>	3	<u>Jasmine</u>	13	\$17.2 million
<u>2012–13</u>	5	<u>Sandra</u>	17	\$161 million
<u>2013–14</u>	6	<u>Ian</u>	12	\$48 million
<u>2014–15</u>	6	<u>Pam</u>	16	> \$250 million
<u>2015–16</u>	8	<u>Winston</u>	50	≥ \$1.41 billion
<u>2016–17</u>	4	<u>Donna</u>	3	≥ \$5 million
<u>2017–18</u>	6	<u>Gita</u>	11	\$285 million
<u>2018–19</u>	5	Pola		≥ \$1.43 million
Totals	50	Winston	126	≥ \$2.2 billion

The top four weather events were as follows:

1. **Winston:** Severe Tropical Cyclone Winston was the most intense tropical cyclone in the Southern Hemisphere on record. It caused \$1.4 bn in damages and 44 fatalities. Most of the damage was focused in Fiji. It destroyed the livelihoods of at least 40,000 people and displaced 40 percent of Fiji's population. Total aid to Fiji was \$117m in 2016 and \$146m in 2017.
2. **Pam:** Severe Tropical Cyclone Pam was the second most intense tropical cyclone of the south Pacific Ocean in terms of sustained winds and is regarded as one of the worst natural disasters in the history of Vanuatu. It causes \$692m in damages and at least 15 fatalities. Most of the damage was focused in Vanuatu but it damaged crops and buildings in the Solomon Islands, Tuvalu and Fiji as well. Initial monetary assistance for Vanuatu included \$3.8 million from Australia, \$2.9 million from the United

Kingdom, \$1.8 million from New Zealand, and \$1.05 million from the European Union. Tuvalu received \$1m in aid from Australia.

3. **Evan:** Severe Tropical Cyclone Evan was considered to be the worst tropical cyclone to affect the island nation of Samoa. It caused damages of \$315 million and 14 fatalities. Most of the damage was limited to Samoa but other islands affected included American Samoa, Fiji, Tonga, and New Zealand. The United States provided NZ\$60,000 to the Samoan Red Cross for relief operations. New Zealand authorities provided at least NZ\$500,000, as well as a P-3 Orion plane to search for eight missing fishermen.
4. **Gita:** Severe Tropical Cyclone Gita was the most intense tropical cyclone to impact Tonga since reliable records began. It caused damages of \$220 million. Torrential rains and damaging winds caused widespread disruptions in Samoa and American Samoa, prompting emergency declarations in both. Outlying islands in the Fijian Lau Islands were significantly affected, particularly Ono-i-Lau and Vatoa. Wallis and Futuna, Niue, and Vanuatu were also affected, but impacts in those areas were minor. India provided US\$500,000 humanitarian aid to Tonga under UNOSSF. On 13 February, Australia provided A\$350,000 (US\$275,000) in emergency supplies via the Royal Australian Air Force (RAAF) to assist more than 2,000 people. Australia also sent humanitarian supplies to the Tongan Red Cross. Two civilian humanitarian specialists were deployed to assist Tonga's National Emergency Management Office. A medical expert also provided assistance to assess health infrastructure. New Zealand provided NZ\$750,000 (US\$544,000) in assistance.

It is difficult to come by aid data for cyclones as aid is dispersed over time. It is also challenging to calculate the cost of indirect aid such as relief supplies, food, transport, aid workers etc.

References

<https://dfat.gov.au/aid/topics/investment-priorities/building-resilience/humanitarian-preparedness-and-response/tc-winston/Pages/default.aspx>

<https://www.oecd.org/dac/financing-sustainable-development/development-finance-data/Oceania-Development-Aid-at-a-Glance-2019.pdf>

References

- Asian Development Bank. (2013, May). *Pacific Private Sector Development Initiative, Phase III*. Retrieved from Asian Development Bank: <https://www.adb.org/projects/46510-001/main>
- Asian Development Bank. (2017, December). *ADB to Help Strengthen Samoa, Tonga, and Tuvalu's Resilience to Disasters*. Retrieved from Asian Development Bank: <https://www.adb.org/news/adb-help-strengthen-samoa-tonga-and-tuvalus-resilience-disasters>
- Asian Development Bank. (2019). *Pacific Disaster Resilience Program (Phase)*. Retrieved from Asian Development Bank: <https://www.adb.org/projects/50028-002/main#project-pds>
- Clarke, D., & Hill, R. (2013). Cost-Benefit Analysis of the African Risk Capacity Facility. *IFPRI Discussion Papers 1292*.
- Cole, S., Gine, X., Tobacman, J., Topalova, P., Townsend, R., & Vickery, J. (2013). Barriers to Household Risk Management. *American Economic Journal: Applied Economics*, 104-135.
- COP23 Fiji. (2017). *Initiative to Develop Pacific Finance and Insurance Products Launched with €1 Million Support from Luxembourg*. Retrieved from COP23 Fiji: <https://cop23.com.fj/initiative-develop-pacific-finance-insurance-products-launched-e1-million-support-luxembourg/>
- Cummins, J., & Mahul, O. (2009). *Catastrophe Risk Financing in Developing Countries*. World Bank.
- Delia, P. (2018). *Pacific Ministers Propose Establishing Resilience, Climate Insurance Funds*. Retrieved from International Institute of Sustainable Development: <http://sdg.iisd.org/news/pacific-ministers-propose-establishing-resilience-climate-insurance-funds/>
- Devex. (2019). *Pacific Catastrophe Risk Insurance Company (PCRIC)*. Retrieved from Devex: <https://www.devex.com/organizations/pacific-catastrophe-risk-insurance-company-pcric-115400>
- Flood Re. (2015). *About Flood Re*. Retrieved from Flood Re: <http://www.floodre.co.uk/about-us>
- GFDRR. (2017). *Samoa: Enhancing capacity for strengthening the implementation of building codes and for improving multi-hazard systems, in preparation for a Cat-DDO*. Retrieved from Global Facility for Disaster Reduction and Recovery: <https://www.gfdr.org/en/samoa-enhancing-capacity-strengthening-implementation-building-codes-and-improving-multi-hazard>
- Gine, X., & Yang, D. (2009). Insurance, credit, and technology adoption: Field experimental evidence from Malawi. *Journal of Development Economics*, 1-11.
- Government of Samoa. (2009). *Samoa Post Disaster Needs Assessment*. World Bank.

- Government of Samoa. (2013). *Samoa Post Disaster Needs Assessment Cyclone Evan 2012*. World Bank.
- Gurenko, E. (2006). *Earthquake Insurance in Turkey: History of the Turkish Catastrophe Insurance Pool*. World Bank.
- IPCC. (2018). *Lending a Hand when Catastrophe Strikes*. Retrieved from Intergovernmental Panel on Climate Change: https://www.ipcc.ch/apps/nj-lite/srex/nj-lite_download.php?id=5612
- Janzen, S., & Carter, M. (2019). After the Drought: The Impact of Microinsurance on Consumption Smoothing and Asset Protection. *American Journal of Agricultural Economics*.
- Karlan, D., Osei, R., Osei-Akoto, I., & Udry, C. (2013). Agricultural Decisions after Relaxing Credit and Risk Constraints. *Quarterly Journal of Economics*.
- Krishna, H. (2005). *Insurance for Vulnerability Reduction: Oxfam's experience of using insurance as a strategy for disaster risk reduction in coastal Andhra Pradesh*. World Bank.
- Linnerooth-Bayer, J., & Mechler, R. (2007). Disaster safety nets for developing countries: Extending public-private partnerships. *Environmental Hazards* 7, 54-61.
- Lowy Institute. (2019). *Pacific Aid Map*. Retrieved from Lowy Institute: <https://pacificaidmap.lowyinstitute.org/>
- Lucas, B. (2015). *Disaster risk financing and insurance in the Pacific*. GSDRC.
- Mahul, O., Cook, S., & Bailey, B. (2015). *PCRAFI Country Note Fiji*. World Bank.
- Mechler, R., Linnerooth-Bayer, J., & Peppiatt, D. (2006). *Disaster Insurance for the Poor?* Provention Consortium.
- Meenan, C. (2017). *Unpacking Basis Risk*. Retrieved from RMS: <https://www.rms.com/blog/2017/08/14/unpacking-basis-risk/>
- OECD. (2015). *Disaster Risk Financing*. Retrieved from OECD: doi:10.1787/9789264234246-en
- OECD. (2015). *Disaster Risk Financing: A Global Survey of Practices and Challenges*. Paris: OECD.
- Pacific Island Forum Secretariat. (2019). *Forum Economic Minister Meeting Notes*. Retrieved from Pacific Island Forum Secretariat: <http://www.forumsec.org/wp-content/uploads/2019/04/PIFS19FEMM.4b-Ag.-Item-4b-Pacific-Islands-Climate-Change-Facility-PICCIF.pdf>
- Pacific Resilience Facility. (2018). *Pacific Islands Forum*. Retrieved from Pacific Resilience Facility Tender: <https://tenders.net/dtp/forumsec/tender?page=current-tenders&tender=1030935&e=1>

Pacific Resilience Partnership. (2017, June 14). *Governance Structure* . Retrieved from Pacific Met Desk: <https://www.pacificmet.net/sites/default/files/inline-files/documents/WP%208.0%20Att%202-PRP%20Working%20Group%20Governance%20Paper%20clean%2016%20June.pdf>

Parsons, T. (2004). Recalculated probability of $M \geq 7$ earthquakes beneath the Sea of Marmara, Turkey. *Journal of Geophysical Research*.

PCRAFI. (2015). *Advancing Disaster Risk Financing & Insurance in the Pacific*. Washington DC: The World Bank.

PCRAFI. (2016). *PCRAFI Facility: Phase II Factsheet*. Retrieved from PCRAFI.

Pilot Program for Climate Resilience. (2012). Retrieved from Climate Funds Update: <https://climatefundsupdate.org/the-funds/pilot-program-for-climate-resilience-2/>

Prabhakar, S., Cummins, J., Pereira, J., & Pulhin, J. (2014). Scaling Up Risk Insurance In The Asia-Pacific Region: Issues And Way Forward. *APN Science Bulletin*.

Prabhakar, S., Rao, G., Fukuda, K., & Hayashi, S. (2013). Promoting Risk Insurance in the Asia-Pacific Region: Lessons from the Ground for the Future Climate Regime under UNFCCC. *Climate Change Adaptation in Practice: From strategy development to implementation*.

Subramanian, A., & Yahel, G. (2013). Dynamic Contracting under Imperfect Public Information and Asymmetric Beliefs. *Journal of Economic Dynamics and Control*.

Talbot, T., & Barder, O. (2016). *Payouts for Perils: Why Disaster Aid is Broken, and How Catastrophe Insurance Can Help to Fix It*. Washington DC: Center for Global Development.

Tigre, M. (2013). Insuring Island States: The Role of Insurance for Small Island States in Responding to the Adverse Effects of Sea Level Rise. *N.Y. Envtl. Law*.

Trail, D., Holland, P., Payne, B., & Gunnell, S. (2019). *The Disaster Risk Financing Landscape in the Pacific: Options Assessments for MFAT Investment*. GNS Science Consultancy Report.

UNDP. (2019). *Pacific Financial Inclusion Programme*. Retrieved from UNDP Pacific: http://www.pacific.undp.org/content/pacific/en/home/operations/projects/poverty_reduction/pfip.html

Varangis, P. S. (2005). *Dischel, B. (Ed.). RiskBooks*. London.

World Bank. (2015). *Pacific Islands Prepare for a More Disaster Resilient Future*. Retrieved from World Bank: <http://www.worldbank.org/en/news/press-release/2015/06/19/pacific-islands-prepare-for-a-more-disaster-resilient-future>

World Bank. (2018, October). *IDA Catastrophe Deferred Drawdown (Cat DDO)*. Retrieved from World Bank: <http://pubdocs.worldbank.org/en/563361507314948638/product-note-cat-ddo-ida-english-2018.pdf>

World Bank. (2019). *Overview of the Pacific Islands*. Retrieved from The World Bank in the Pacific: <https://www.worldbank.org/en/country/pacificislands/overview>

Wright, N. (2013). *Background Paper prepared for the Global Assessment Report on Disaster Risk Reduction 2013*. Geneva: United Nations.

Yang, D. (2008). Coping with Disaster: The Impact of Hurricanes on International Financial Flows, 1970-2002. *The B.E. Journal of Economic Analysis & Policy*.

Yang, D., & Choi, H. (2007). Are Remittances Insurance? Evidence from Rainfall Shocks in the Philippines. *The World Bank Economic Review*.