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Disaster Risk Insurance

Disaster risk insurance schemes cover—against a premium—the costs incurred by the insured entity from extreme weather and natural disasters (such as earthquakes or floods). If the event occurs, the insurer refunds a percentage of the costs incurred. Insurance schemes are widely used to increase the resilience of individuals, companies and public entities to external shocks and reduce their future expenditures in case of a disaster.

Key Words: insurance; climate-insurance; climate-risk; resilience bonds; parametric insurance

How does it work?

Damaged production facilities, shattered transportation infrastructure and business interruption produce direct losses and indirect costs in the form of foregone output (<http://www.bis.org/publ/work394.htm>). This is what natural disasters produce. In 2015 the number of natural catastrophes surpassed the 1,000 threshold for the first time, with an estimated loss of over US\$90 billion out of which only 30 percent was insured. Losses have risen significantly over the last three decades as a result of economic development, population growth, urbanization, and a higher concentration of assets in areas exposed to climate change. Climate change is expected to continue to exacerbate both the impact and the number of calamities, reducing agricultural productivity, making access to water difficult, and causing energy stress and higher incidences of disease. This review focuses on the provision of disaster risk insurance products as a cost-saving and risk-management strategy.

Disaster risk insurance triggers a pay-out by the insurer when a disaster occurs, e.g. when a tsunami hits or rainfall falls below a certain threshold. At its most basic level, insurance commits an individual or entity to pay a fixed amount at regular intervals (premium) into a common fund (the scheme), from which money is retrieved (pay-out) to compensate for losses arising from a predefined event (coverage). The pay-out helps to moderate the financial impact of external shocks, so that the livelihood and business of the insured are not jeopardized by the occurrence of an extreme natural event. As well as property and industrial and agricultural assets, natural capital assets, such as natural forests, coral reefs and mangroves, can potentially be insured.

Disaster risk insurance covers hazards arising from geological, meteorological, hydrological, climatological, oceanic, biological, and technological/man-made events, or a combination of them. Natural hazards include earthquakes, floods, storms, tsunamis, droughts and freezes. Man-made hazards can also be insured against, including air/water/soil pollution, nuclear radiation, toxic waste, dam failures, transport accidents, factory explosions, fires, and chemical spills.

Insurance schemes can be private or public, mandatory or voluntary, direct or indirect. The government—the insurer of last resort in the event of natural disasters—can rely on the private sector for insurance schemes or establish public social security schemes on its own or in partnership with other governments. The coverage of losses arising from natural disasters remains limited even in developed countries: Hurricane Sandy produced more than US\$68 billion losses in the East Coast of the USA in 2011, of which only around 40 percent were insured. More than 6.5 million US homes (<http://www.ceres.org/resources/reports/insurer-climate-risk-disclosure-survey-report-scorecard-2014-findings-recommendations/view>) are estimated to be at risk of storm surge damage, with a potential damage (i.e. cost of reconstruction) of US\$1.5 trillion. The Great East Japan earthquake and tsunami generated losses estimated at US\$210 billion, of which only 17 percent were insured.

In developed countries the insurance market is dominated by private companies offering commercial products. The market is composed of insurance companies (that sell insurance to consumers) and re-insurance companies (that buy, pool together and eventually securitize insurance portfolios across, time, geography and risk categories). Even in private-sector-dominated markets access to disaster risk insurance schemes is often incentivized, for example through tax deductions.

The availability of disaster risk insurance schemes in the developing world is growing. Property catastrophe insurance programmes for homeowners have emerged in middle-income countries such as Turkey with the Catastrophe Insurance Pool (<http://siteresources.worldbank.org/FINANCIALSECTOR/Resources/CATRISKbook.pdf>) established in the aftermath of the Marmara earthquake. More recently, the ClimateWise Compendium (<https://www.cisl.cam.ac.uk/business-action/sustainable-finance/climatewise/pdfs/climatewise-compendium-of-disaster-risk-transfer.xlsm/view>) profiled over 120 related programmes in developing countries: one third made up of agricultural indemnity-based schemes; one third agricultural index-based schemes, followed by disaster micro-insurance and sovereign risk transfers. The majority of schemes are either national (35 percent) or local (24 percent). Despite the emergence of innovative programmes, growth is still limited by the size of the insurance market and by the ability to pay premiums. The coverage is as a result often limited: Typhoon Mirinae in 2009 triggered losses of around US\$280 million in Vietnam (http://media.swissre.com/documents/Flood_focus_Vietnam_en_factsheet_FINAL.pdf) of which only 3.6 percent were covered. There is a potential market (<https://www.lloyds.com/~media/lloyds/reports/360/360%20other/insuranceindevelopingcountries.pdf>) in developing economies estimated at between 1.5 and 3 billion policies.

An insurance scheme is “**direct**” or “**traditional**” when the insured entity—an individual or a company—signs a contract with the insurance provider, i.e. without intermediation. These are typical insurance products offered by private companies, where the insured party receives a pay-out directly from the insurer (e.g. a farmer from an insurance company) upon the occurrence of an event (e.g. a drought). The periodical payment of an insurance premium is required. The premium might, however, be unaffordable to the average worker, household or company in a developing country. Nevertheless, similarly to micro-credit, financial products can be optimized for less wealthy clients. **Microinsurance** has expanded the reach of insurance products to lower-income individuals and informal businesses, including crop and livestock insurance (e.g. Philippines Corp Insurance (<http://pcic.gov.ph/>) and Mongolian Index Based Livestock Insurance (<http://www.worldbank.org/en/news/feature/2009/09/23/index-based-livestock-insurance-project>)).

The insurance scheme is “**indirect**” or “**mutual/cooperative**” when the contractual arrangement between the insured entity and the insurer is intermediated by a third party. The intermediary can be a government (e.g. through regional risk insurance pools) or an institution that has negotiated insurance cover for its clients (e.g. credit unions, microfinance institutions, savings clubs, etc.). Pooling schemes often offer better terms. For developing countries, the establishment of regional risk facilities (e.g. the Pacific Catastrophic Risk Assessment and Financing Initiative (<http://www.spc.int/>), Caribbean Catastrophic Risk Insurance Facility (<http://www.ccrif.org/>) and African Risk Capacity (http://www.africanriskcapacity.org/c/document_library/get_file?uuid=9fb04f73-f7c4-47ea-940f-ebe275f55767&groupId=350251)) programme is a relatively recent phenomenon. Countries that become members can receive pay-outs to be invested in public rehabilitation programmes (public buildings and assets like roads, maintaining police forces, keeping ministries running following a major catastrophe). African governments pay a premium to join African Risk Capacity (<http://www.africanriskcapacity.org/home>), a continent-wide pooled risk mechanism which has also been supported by development partners. When rainfall in a participating country falls below a certain threshold, this triggers a speedy pay-out—within 2-4 weeks of the end of the rainfall season—allowing the government to start taking action almost immediately to protect and assist its citizens.

Innovations in technology, including weather reporting/forecasting and satellite imagery, have increased the number of options available to determine the trigger for the insurance payment. Parametric insurance schemes, for example, are defined on the basis of a pre-determined amount and a specific parameter, e.g. wind speed, strength of a hurricane, rainfall amounts, and the magnitude of an earthquake. The pay-out from the Caribbean Catastrophe Risk Insurance Facility (<http://www.ccrif.org/>) to the government of Haiti after the earthquake is an example of the use of a parametric insurance scheme. The same facility financed rescue and relief operations after the 2017 hurricane season in Antigua and Barbuda, St Kitts and Nevis and Anguilla (<https://www.economist.com/news/americas/21729003-too-little-not-too-late-caribbeans-pioneering-form-disaster-insurance>).

By providing predictable financial relief, disaster risk insurance improves the resilience of government balance sheets and those affected by natural disasters, as well as incentivizing risk mitigation actions through the use of premium discounts (lower premiums to reward risk-reducing behaviour). The discounts can be further enhanced with capacity-development provisions on risk awareness for households and/or farmers. In the case of sovereign pooling mechanisms, premiums can be lowered to governments that retrofit their public infrastructure against disaster risks, for example.

Disaster risk insurance schemes often require partnerships between governments, international organizations and the insurance industry. Governments can incentivize enrolment through legislation, oversight and anti-trusts, subsidies, and complementary investments in risk awareness. The insurance industry can share risk information with policymakers (e.g. by means of improved risk mapping and zoning tools, as well as supporting improved construction standards) to make available risk data, help promote awareness in society, innovate, build capacity and even invest directly in risk reduction measures to avoid large compensation claims. International organizations and development partners can assist countries and the private sector in establishing and reinforcing insurance markets as well as regional and international risk pooling facilities (e.g. Global Facility for Disaster Reduction and Recovery (<https://www.gfdrr.org/>), Global Index Insurance Facility (http://www.ifc.org/wps/wcm/connect/industry_ext_content/ifc_external_corporate_site/industries/financial+markets/retail+finance/insurance/global+index+insurance+facility), Weather Risk Management Facility (<https://www.wfp.org/climate-change/initiatives/weather-risk-management-facility>)).

Disaster insurance is not the only financial mechanism available to government and communities in the event of a disaster. Multilateral development banks have created special lending facilities for countries suffering from disasters, while public organizations are allowed to issue new debt in the aftermath, sometime tax free. Large insurance companies have issued [catastrophe bonds](https://www.brookings.edu/blog/the-avenue/2015/12/16/financing-infrastructure-through-resilience-bonds/) to better manage their own risks. Some of these instruments are, however, more closely related to the insurance industry. Resilience bonds (<https://www.brookings.edu/blog/the-avenue/2015/12/16/financing-infrastructure-through-resilience-bonds/>), for example, were designed to link insurance coverage procured by the public sector with capital investments in [resilient infrastructure](#). The aim is to reduce expected losses from disasters and the insurance premium attached to the risk. The bonds' proceeds can fund interventions such as protection programmes or fire prevention measures. These alternative financial instruments will be covered in a separate entry to the platform [upcoming, 2018].

Stakeholders

- **Beneficiaries/insured entity/party:** Individuals, households or companies receiving the insurance pay-out after the occurrence of a certain event. In the case of direct approaches, individuals or companies pay a premium and receive a pay-out when the insurance agreement is triggered. In the case of an indirect approach, the premium is paid by or through a third party.
- **Government/regulators:** Other than being the insurer of last resort, governments can promote (and incentivize) public and private insurance schemes. They are also responsible for providing the legal framework and oversight over the insurance industry.
- **Insurance/reinsurance industry** (e.g. banks, credit unions, development finance institutions): Insurers offer insurance solutions to the consumer market while the reinsurers (e.g. Re-Swiss (<http://www.swissre.com/>), Munich Reinsurance Company (<http://www.munichre.com/en/homepage/index.html>)) offer financial products to the insurers themselves. Reinsurers cover an estimated 55–65 percent of insured losses in natural catastrophes, while the rest is credited to insurers and insured depending on the insurance policy.
- **Donors/facilitators:** Provide technical assistance and official development assistance to raise awareness for and implement disaster related insurance schemes.

Potential in monetary terms (revenues, realignment or savings)

While the monetary impact can be roughly assessed over the pay-outs allocated to insured entities affected by natural calamities and the ratio between the premium and the amount of insured losses, the economic and financial benefits of disaster risk insurance go further by encompassing cost-saving measures such as investments in mitigation, immediate financial relief, etc. The value of pay-outs is dependent on the coverage, catastrophes' geography and type of events and can vary greatly year by year. Insurers paid out about US\$27 billion for natural disaster claims in 2015, mostly in developed countries. Other than pay-outs, disaster risk insurance can generate savings due to cost-efficiency: the African Risk Capacity (<http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/127813>), shows that for each US\$1 of insurance pay-out US\$4.4 of international aid can be foregone.

A few examples from regional risk-sharing facilities, donor supported programmes and micro-insurance are profiled below. After the earthquake in Haiti, the Caribbean Catastrophe Risk Insurance Facility (<http://www.ccrif.org/>)—designed to address hurricane and earthquake risk in the Caribbean—paid US\$8 million to the government within two weeks of the disaster, providing emergency liquidity. Since 2007 the facility has approved eight pay-outs totalling US\$38 million to eight member governments. In 2015 the African Risk Capacity paid out US\$26 million to Senegal, Mauritania and Niger against extreme droughts for an annual premium of US\$930,000 which is paid through a USAID grant. The insurance contract can trigger a maximum pay-out of about US\$7 million in the case of very severe droughts.

Innovation in the micro-insurance market, public-private partnerships and donor engagement can reduce (or transform) the premium farmers pay while providing sufficient pay-out to manage through drought periods. The Rural Resilience Initiative is a risk management approach that helps communities become more resilient to weather variability in Africa. In 2012 the facility released pay-outs to Ethiopian farmers of US\$322,772 as a result of the drought conditions. Farmers pay the premium with their labour through the Insurance-for-Assets scheme.

When is it feasible?

Legal and/or other feasibility requirements

The functioning of private insurance markets requires a supporting regulatory framework, the existence of service providers, access to regional or international reinsurer markets, and the availability of reliable data on risks and vulnerability. The enrolment of individuals and companies into insurance schemes depends on multiple variables including acceptance of risks, cultural norms. The capacity to pay a monetary premium remains a challenge for the poorest communities, despite the availability of alternative approaches as highlighted above.

The participation of government in regional and international risk pooling mechanisms requires the submission of comprehensive disaster risk management strategies/programmes. For example, the African Risk Capacity requires participating countries to submit an operations plan and a final implementation plan that include detailed information on how an African Risk Capacity pay-out would be utilized in a specific situation.

Minimum investment required and running costs

The provision of disaster risk insurance can be offered by the private sector at market terms with no direct costs for developing countries' governments. However, given the inability to pay monetary premiums by developing countries individuals and companies, innovative solutions that blend governments' own resources, official development assistance and reduced contributions by farmers have been proposed.

In the case of sovereign risk regional pooling schemes, the costs relate to the set-up of the scheme and the payments for the initial capitalization represent. When the Caribbean Catastrophe Risk Insurance Facility (<http://www.ccrif.org/>) was set up, 16 governments contributed resources ranging from US\$200,000 to US\$4,000,000 depending on the exposure of their respective countries to earthquakes and hurricanes. Initial funding by development partners was provided to match governments' own contributions. A total of US\$150 million was earmarked by the US, Germany, France, Canada and the UK for the capitalization of the African Risk Capacity (<http://www.africanriskcapacity.org/>), which was established as a Specialized Agency of the African Union (<http://www.au.int>).

When it is more appropriate

- Disaster risk insurance—if applied in tandem with other risk reduction measures—can offset the negative impacts of hazards, such as storms, floods and droughts, by supporting adaptation and increasing the risk resilience of vulnerable people.
- Disaster risk insurance may not be appropriate for some slow-onset climate-induced processes (e.g. sea level rise, desertification) or for disastrous events that occur with very high frequency (e.g. recurrent flooding).
- The set-up of disaster risk insurance schemes has costs. A careful cost-benefit analysis should be undertaken to determine the appropriateness of disaster risk insurance against direct investment in risk prevention.

What are the main risks and challenges?

Pros

- Insurance provides reliable and timely financial relief for recovery of livelihoods and reconstruction, providing security in the post-disaster period. As a result it can prevent people from falling into poverty and destitution, or provide the liquidity necessary to restore livelihoods.
- Insurance helps create a space of certainty and stability for the individual, institutions and government within which investments and planning can be undertaken. This allows, for example, for climate-resilient investments in climate-sensitive sectors such as tourism and agriculture as well as in job creation and market development.
- Outreach towards poor and vulnerable communities can be secured in a relatively short period of time.

- Technological innovations, such as satellite imaging and mobile phones, have substantially lowered the costs of evaluating claims in remote and poor regions and thus of insurance products.
- Pooling risks over a wide geographical spectrum allows risk diversification: as a result risk premiums can be reduced considerably, thus ensuring affordability for many countries that otherwise might not be able to access to receive insurance coverage. The temporary loss of tax revenues and the sudden increase in public expenditures for reconstruction can easily condemn vulnerable countries to a downward fiscal and macroeconomic spiral. Disaster risk insurance—especially pooled mechanisms—can help countries cope with these macroeconomic shocks.

Cons

- Insurance can help individuals and countries to recover from disasters and incentivize preparedness, but cannot prevent risks as such nor the loss of lives and assets. On its own, insurance will thus not be sufficient. Insurance schemes need to be complemented with other disaster-risk reduction strategies, such as integrating disaster risks into development planning, collection of data, setting up early warning systems, awareness raising, contingency planning, etc.
- Disaster risk insurance can be comparatively costly compared with other disaster risk reduction measures.
- Insurance premiums may be set too high for the poor or the poorest countries. Affordability will be determined by the availability of public incentives or depend on grants from donors.
- Maintaining the affordability of insurance schemes in light of more frequent and impactful extreme weather events might become unrealistic. Traditional insurance schemes might become unsuitable due to sea-level rise and desertification.

Risks

- Access to reliable information: Risk assessment requires reliable data and institutional risk assessment capabilities, which is still limited in many countries.
- Accessibility: It is important that insurance schemes address the needs of all beneficiaries and stakeholders involved so that coverage is maximized.
- Affordability: Premiums may not be affordable for low-income households.
- Financial sustainability of the scheme: Direct insurance schemes can only be commercially viable if there is a steady stream of premium income at scale to cover future pay-outs.
- Un-insurability associated with increasing frequency and magnitude of extreme weather events. Insurers may withdraw from markets as the risks become too high for the pool of premiums available.

How can the design be ameliorated to improve the impact?

Disaster risk insurance can contribute to human security by mitigating the impact of future losses of economic assets and income (and even lives in the immediate post-disaster period). It can deliver effective and reliable post-disaster relief assistance and promote incentives for undertaking preventive measures. It provides certainty for weather-affected public and private investments and allows for better planning. Better financial planning and insurance, like health insurance, can in turn prevent households and individuals falling back into poverty traps due to external shocks. It can also ease access to basic services in health, education and economic recovery post-disasters. A stronger contribution to social and environmental impacts can be achieved through:

- The incorporation of product design features that maximize the affordability and reach of insurance products among the poor and vulnerable. Constant innovations in micro-insurance and technology can help to better encompass the needs of the poor. Index-based insurance contracts based on a forecast, where claims can be paid before the hazard strikes, are an example for the provision of necessary liquidity for loss-reducing activities to poor households.
- The provision of discounts on premiums due by public incentives or contributions from official development assistance. Public support is critical in the initial stages of market development to reduce entry barriers and risks. Subsidies should be designed to maximize the correct targeting of beneficiaries.
- Rewards for risk mitigation investment and behaviours can both reduce the cost of the insurance and the probability of losses.
- Disaster risk insurance schemes should be matched with other risk reduction measures and/or be embedded in broader risk reduction strategies, including capacity development and risk awareness strategies. The Rural Resilience Initiative (<http://www.wfp.org/climate-change/initiatives/r4-rural-resilience-initiative>) is an example where micro-insurance is combined with packages of different measures. Another option is integrating insurance into governments' national social protection schemes, as in Ethiopia, through the Productive Safety Net (<https://www.wfp.org/sites/default/files/PSNP%20Factsheet.pdf>) programme, and in Kenya, through the Hunger Safety Net (<http://www.hsnp.or.ke/>) programme.
- The collection of data to develop insurance products is critical for two reasons. First, only solid datasets in developing countries will allow new insurers to enter their markets. For example, lack of data often impedes insurance products from covering fire and drought risks. Second, governments and private companies often underestimate the potential savings linked to insurance products because they cannot estimate their expected economic loss in the case of a disaster. An informed assessment of the expected economic loss can facilitate the emergence of insurance markets.
- The insurance coverage of natural capital assets against disaster risks should be expanded, based on early experiments in insuring natural forests, mangroves and coral reefs. A few insurance companies offer insurance coverage for natural forests against fire, lighting, and extreme natural events while the Nature Conservancy (<https://global.nature.org/content/insuring-nature-to-ensure-a-resilient-future>) is exploring an insurance mechanism for reefs.

Ultimately, to offer sustainable insurance solutions in the future, essential measures to adapt to the impacts of climate change need to be implemented. Public and private decision makers should develop risk reduction /climate resilience strategies collaboratively, while at the same time pursuing the goal of substantially reducing greenhouse gas emissions.

Guidelines and Case Studies

Detailed guidance

- Catastrophe Risk Financing in Developing Countries (<http://siteresources.worldbank.org/FINANCIALSECTOR/Resources/CATRISKbook.pdf>)
- Climate risk insurance for the poor and vulnerable countries (http://www.climate-insurance.org/fileadmin/mcii/documents/MCII_2016_CRI_for_the_Poor_and_Vulnerable_full_study_lo-res.pdf)
- UNEP Finance Initiatives Principles for Sustainable Insurance (<http://www.unepfi.org/psi/>)
- Disaster Risk Finance Across the Globe (YouTube Video by the World Bank) (<https://www.youtube.com/watch?v=VtvQaJx71E0>)

Case studies

- African Risk Capacity (http://www.africanriskcapacity.org/c/document_library/get_file?uuid=9fb04f73-f7c4-47ea-940f-ebe275f55767&groupId=350251)
- Caribbean Catastrophe Risk Insurance Facility (CCRIF) (<http://siteresources.worldbank.org/PROJECTS/Resources/Catastrophicriskinsurancefacility.pdf>)
- Scaling up index insurance for smallholder farmers: Recent evidence and insights (http://reliefweb.int/sites/reliefweb.int/files/resources/CCAFS_Report14.pdf)
- Insurance-related instruments for disaster risk reduction (http://www.preventionweb.net/english/hyogo/gar/2011/en/bgdocs/Suarez_&Linnerooth-Bayer_2011.pdf)

