



Food and Agriculture Organization
of the United Nations

Protecting livelihoods

Linking agricultural insurance
and social protection





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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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Cover photograph: A woman carries supplies through a flooded street in Cap Haïtien.

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Abbreviations and acronyms

ADB	Asian Development Bank
AGROASEMEX	Agro-Aseguradora Mexicana
ANAGSA	Aseguradora Nacional Agrícola y Ganadera, S.A. (Mexico)
ASAL	Arid and semi-arid land
ASIS	FAO Agriculture Stress Index System
BACEN	Banco Central do Brasil
BRL	Brazilian Real (currency)
CADENA	Componente de Atención a Desastres Naturales (Mexico)
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CLAC	Coordinadora Latinoamericana y del Caribe de Pequeños Productores y Trabajadores de Comercio Justo
ESP	Inclusive Rural Transformation and Gender Equity Division
FAO	Food and Agriculture Organization of the United Nations
FI	Financial Institution
FOGASA	Fondo de Garantía para el Campo y del Seguro Agropecuario (Peru)
GDP	Gross Domestic Product
GSMA	GSM Association
HSNP	Hunger Safety Net Programme (Kenya)
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFRC	International Federation of Red Cross and Red Crescent Societies
ILO	International Labour Organization
ILRI	International Livestock Research Institute
INMET	Instituto Nacional de Meteorologia (Brazil)

INR	Indian Rupee (currency)
KES	Kenyan Shilling (currency)
KLIP	Kenya Livestock Insurance Programme
LMICs	Low- and middle-income countries
MCII	Munich Climate Insurance Initiative
MPCI	Multiple Peril Crop Insurance
NAIS	National Agricultural Insurance Scheme (India)
NGO	Non-governmental organization
NPCI	Named Peril Crop Insurance
NVDI	Normalized Difference Vegetation Index
PPP	Public-private partnership
PMFBY	Pradhan Mantri Fasal Bima Yojana (India)
PROAGRO	Programa de Garantia da Atividade Agropecuária (Brazil)
PRONAF	Programa Nacional de Fortalecimento da Agricultura Familiar (Brazil)
PSR	Programa de Subvenção ao Prêmio do Seguro Rural (Brazil)
R4	Rural Resilience Initiative
R&D	Research and development
RISE	Rural Institutions, Services and Empowerment Team of FAO
SAC	Seguro Agrícola Catastrófico (Peru)
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (Mexico)
SEAF	Seguro da Agricultura Familiar (Brazil)
SIIFE	Satellite Index Insurance for Pastoralists in Ethiopia
SUSEP	Superintendência de Seguros Privados (Brazil)
TARSIM	Agricultural Insurance Pool (Turkey)
WFP	World Food Programme
USD	United States Dollar (currency)

Section 1:

Methodological framework

1.1. Social protection and agricultural insurance: core concepts

While heterogeneous and diverse, rural populations in developing and emerging contexts share a number of commonalities, in terms of, for example, their relation to **agriculture as a core source of income and livelihood stability**, the elevated poverty levels they face and their considerable exposure to a variety of different risks (e.g economic, social, environmental and health-related risks), as well as their limited capacity to cope with these shocks. The combination of these aspects makes rural populations extremely vulnerable to the effects of climate change and the associated **increased risk exposure to natural hazards**, which pose a growing threat to their livelihoods and way of life.

In the frame of disaster risk management and the mitigation of vulnerability to climate change, **social protection systems** can play a fundamental role at systemic level in bridging the gap between emergency, post-disaster measures, and longer-term development interventions that focus on rehabilitating rural populations' livelihoods. Following FAO's definition, a **social protection system** is "a set of policies and programmes that address economic, environmental and social vulnerabilities to food insecurity and poverty by protecting and promoting livelihoods" (FAO, 2017a).

Social protection systems are composed of three core types of interventions:

i. **Social assistance interventions:** these are non-contributory programmes, monetary or in-kind, usually targeted at the poor or particularly vulnerable categories of the populations. They

include, for example, cash transfers (conditional and unconditional); in-kind transfers, such as school feeding and targeted food assistance; and near cash benefits such as fee waivers and food vouchers;

ii. **Labour market programmes and policies:** these interventions provide unemployment benefits, build skills and ensure better access to the workforce, as well as ensuring decent and inclusive work standards;

iii. **Social insurance interventions:** these are contributory programmes, aimed at protecting individuals and families against economic shocks, usually along their entire lifecycle. This category includes, traditionally, publicly provided or mandated insurance schemes against old age, disability or the death of the main household provider, maternity leave and sickness cash benefits, and social health insurance. In the frame of these interventions, participants receive benefits or services in recognition of their contributions to a specific scheme (Honorati *et al.*, 2015).

Through a combination of such interventions, social protection systems can play two main roles when it comes to managing disaster risk: a **protective role**, by providing an income buffer that provides the means for households to access food and resources, thus mitigating the impact of external shocks; and a **preventive role**, by reducing the vulnerability of households to shocks through interventions that foster their resilience (Devereux and Sabates-Wheeler, 2004). In addition to these roles, social protection can also have a promotive and transformative role, which is critical for poverty reduction and resilience.

Typically, social protection systems are designed to address idiosyncratic shocks and chronic vulnerability. However, **risk-informed and shock-responsive social protection systems** can also be designed and implemented to provide support to vulnerable rural populations both before, during and in the aftermath of covariate shocks, such as natural disasters. The types of interventions scaled up to respond to these shocks fall into the non-contributory social assistance category. In this sense, the recent COVID-19 crisis has been the first notable instance where a number of social insurance schemes, mainly health coverage and unemployment benefits, have been extended far beyond their normal reach.

Social protection systems are ideally designed following a **life-cycle approach**, which addresses the specific risks and vulnerabilities faced by individuals at various stages of their lives, through different combinations of tailored interventions, which should be designed by taking into consideration the specific characteristics of the livelihoods of the people they target. However, this specific component is often a weak point in social protection systems, especially in nascent and less mature ones, which usually focus their efforts on early childhood and old age. When considering that social protection systems have a specific role to play in disaster risk management at systemic level,¹ given their **potential to bridge the gap** between emergency and development interventions, this issue of adequate protection becomes even more critical.

In this frame, **agricultural insurance** can act as an effective tool to increase vulnerable farmers' resilience against large-scale, covariate shocks – such as high-impact natural events – that negatively affect large shares of the overall rural population.² Providing insurance against disaster risk in agriculture has the potential to fill an important gap in the traditional social protection toolbox, which is the **lack of flexible and rapidly scalable risk transfer tools** that can

provide a buffer against a wide range of catastrophic events. In the frame of such an approach, agricultural insurance and other, complementary social protection interventions can be implemented in a **holistic manner**, with a view to building livelihood resilience among rural households, strengthening assets, incentivizing investments and promoting effective risk management practices. While agricultural insurance focuses primarily on disaster risk, providing a timely financial buffer against external shocks, a combination of other types of social protection interventions can be employed to manage various other aspects of risks faced by individuals and households.

Strategic risk layering stands at the core of this approach: it implies gaining a comprehensive vision of the different risks faced by vulnerable households, categorizing such risks according to different tiers, and choosing the correct combination of strategies and instruments that allow each tier to be addressed in an efficient and cost-effective manner. Different kinds of hazards are broken down according to their frequency, magnitude and associated levels of loss, with governments (or other public entities) selecting the best combination of different instruments for each layer according to a number of factors, which include the scale of funding required, the rapidity at which funds need to be disbursed and the relative cost-effectiveness of alternative measures for specific layers of risk (ADB, 2019). As part of this integrated approach, measures such as, for example, a combination of insurance products, input subsidies, cash transfers, enhanced production methods, and training and education on risk mitigation practices can all be used as part of an **integrated disaster risk management strategy** that targets vulnerable households (InsuResilience, 2019; Le Quesne *et al.*, 2017). As such, agricultural insurance can be viewed as an effective complement to social protection interventions, as detailed below.

¹ In accordance with the 2016 World Humanitarian Summit's call to transcend the humanitarian-development divide (FAO, 2017a).

² Systemic shocks can have a catastrophic impact on a large number of people. This impact is partially offset by the buffer effect of social protection interventions, and, in particular, social assistance ones. This scenario is improved in contexts where social protection systems are risk-informed and shock-responsive, although such measures put a considerable strain on systems and budgets.

1.2. Benefits of linking agricultural insurance with social protection systems

Agricultural insurance is a special line of insurance applied to agricultural activities, which aims to protect farmers (and other agricultural value chain actors) against the risks they face as part of their business, while also contributing towards enhancing their productivity. It is not limited only to crop production, but can also cover livestock, forestry, aquaculture and other related activities. As will further be illustrated in Section 2.3, agricultural insurance is a unique sub-category in the insurance domain which carries its own range of specific challenges and constraints. It therefore requires a particular degree of specialization on the part of the insurer, as well as a range of other support actors involved.

From a social protection perspective, agricultural insurance has the potential to generate a wide range of benefits for poor small-scale farmers – and other vulnerable agricultural value chain actors – in developing and emerging contexts. An agricultural insurance scheme can act as a fundamental **shock-responsive component within a broader social protection system**, providing low-income farming households with an essential (and timely³) layer of protection against natural hazards (such as droughts, floods, pests and diseases), while acting in synergy with traditional social protection measures that focus on chronic vulnerabilities (for example conditional or unconditional cash transfers, as well as capacity building to enable alternative employment opportunities).

As a component of a broader social protection system which focuses on small-scale producers, agricultural insurance has the potential to generate positive impact – both from a micro- and macro-level perspective – in a number of different ways:

- » It supports farmers⁴ in smoothing their consumption and regulating their cash flows, while providing a **financial buffer** (or safety net) that can help to rehabilitate their households and businesses in the aftermath of a shock (i.e. a protection effect). This has the important consequence of reducing farmers' reliance on negative coping strategies following the shock, such as selling assets or resorting to informal and unfavorable (and often exploitative) loans. Over time, it can help farmers to become more resilient to disasters and other economic shocks, with important indirect effects on a number of livelihood-related indicators (InsuResilience, 2019). In the long term, this kind of **insurance-enabled safety net**, directed at poor farmers, can safeguard their gradual and slow ascent out of poverty. This reinforces the traditional functions of social protection systems by broadening the type of risks considered;
- » It can contribute towards strengthening the **credit profile** of farmers – in the eyes of formal financial institutions (FIs) – and assist them in accessing the financing they need to invest in technologies and equipment that can strengthen the productivity, sustainability and resilience of their business (i.e. a transformative effect). Apart from the credit-enhancing effect of insurance, an insurance scheme can also bundle the offer of insurance with that of other complementary financial services (such as savings accounts), allowing the farmer to be exposed to – and familiarized with – new financial tools and opportunities. From the perspective of governments and other public entities this **bundled offer of financial services** can be part of a comprehensive risk management approach – directed at vulnerable agricultural actors – that falls within a broader social protection strategy;

³ *Timeliness* is a key advantage of agricultural insurance, compared with the vast majority of post-disaster rehabilitation measures which can be enacted by governments and humanitarian agencies. While on average the latter tend to start only several months after the extreme event has taken place, insurance (especially in its index-based iterations, as will be illustrated in Section 2.4) can allow for recovery in the immediate aftermath, provided that the necessary enabling elements are set in place.

⁴ Please note that even though for brevity's sake this paper will commonly use the term farmers throughout the text, the broad theoretical and methodological considerations expressed in this study also apply to sectors such as forestry, aquaculture, herding and fisheries.

- » It can foster the **adoption of improved farming practices** on the part of farmers, in order to reduce their risk exposure to natural hazards (i.e. a promotive effect). This effect can be achieved only when moral hazard is adequately controlled for (see Section 2.3.2 for more on this), through a combination of good insurance product design, appropriate monitoring and best choice of coverage modality;
- » It may reduce the **stress, tensions and anxiety** associated with agricultural work, allowing farmers to be more creative and daring in their professional endeavors. This can generate important indirect effects on a farmer's physical and psychological well-being, as well as for that of his or her household (Farrington, Holmes and Slater, 2008). When designed correctly, an insurance scheme can promote **prudent risk-taking** among farmers, as they become more willing to invest in their productive activities when they know they are covered by insurance (for example, by buying higher quality seeds).
- » It can contribute towards strengthening **job security** by keeping agricultural enterprises from going out of business and their employees from losing their jobs. Even if the agribusiness survives the shock, one of the traditional coping reactions of agri-entrepreneurs in the aftermath of a natural disaster is **reducing the amount of hired labour**, which further strengthens the case for agri-insurance as a tool to mitigate labour loss and foster employment security. Furthermore, it must also be noted that the overarching effects of a natural disaster on local agricultural economies (e.g. a decrease in income throughout the agri-value chain; an increase in loan default rates; a generalized fall in demand throughout the economy) are also indirect factors contributing to employment loss at macro level (Wenner, 2005).
- » From the perspective of governments seeking to protect the livelihoods of farmers against natural disasters, providing these actors with insurance – as opposed to post-disaster cash transfers – can

provide a number of benefits: 1) as the cost of the insurance premium is decided *ex ante*, public budgets and resource consumption forecasts related to disaster risk management become **easier to manage and predict**; 2) the **overall financial resource consumption can be lower** with the insurance option, depending on the context, compared with direct cash transfers; and 3) the liquidity needed for **post-disaster payouts** is made readily available by the insurers following a catastrophe, as opposed to the need to find (*ex post*) the required public resources for direct cash transfers from other budget lines.⁵ In any case, it is important to note that the choice of insurance provision over direct post-disaster payouts is **highly context-dependent**, with no measure being intrinsically better than the other; in fact, depending on the nature and intensity of the external shock, the two measures can also coexist within the same programme of intervention.

In short, agricultural insurance should be viewed as a critical tool that governments, development agencies and other public and private stakeholders can use to pursue and complement objectives related to social protection for small-scale and vulnerable farmers, especially in the frame of climate change and increasing disaster risk. That is why, over the years, governments – especially in developing and emerging contexts – have experimented with **multiple iterations of large-scale insurance schemes** aimed at establishing social safety nets against disaster risk for smallholders, even though these programmes have met with a wide number of challenges that constrained their efficacy and – especially – their sustainability, as will be further illustrated in Section 2.1.

It remains quite challenging from a methodological perspective to provide a clear and unambiguous definition of an agricultural insurance scheme that acts as an instrument of a broader social protection strategy, considering the large variety of existing insurance schemes (both public and public-private in nature) that could be said to fall into this category.

⁵ Note that the choice of insurance provision can be viewed as most appropriate, from the perspective of a public decision-maker and budget holder, to protect against external shocks characterized by *moderate to high severity*, as well as *low frequency*. In the case of frequent events (those occurring more than once in five years), a range of alternative measures (such as savings promotion or contingency funds) make more sense from an economic perspective (ADB, 2019).

Box 1: Macro-, meso- and micro-level schemes for agricultural insurance

Macro-level insurance consists of schemes in which the intended beneficiaries (for example the smallholder population) are not the direct owners of the agricultural insurance policy. A public entity (e.g. the central or regional government, or a multinational pool of governments) acts as the policyholder, contracting directly with the insurers on behalf of the population segment they wish to cover, and paying the premium. The final beneficiaries might be asked to contribute in part to the premium payment, although this might not always be the case. Once a disaster strikes – and a payout is triggered – the public entity can use the funds received from the insurer for a variety of purposes, such as maintaining government services, providing ex post assistance to affected populations, ensuring the stability of public budgets, and so forth. In some cases, these payouts can be channeled to the population through existing social protection programmes and be distributed through pre-determined contingency plans (InsuResilience, 2019).

Meso-level insurance schemes refers to schemes in which specific aggregators at meso-level (such as financial service providers, public agencies at regional level, farmers' cooperatives) act as the policyholder on behalf of a defined group of beneficiaries. This allows the aggregation of risk and diversification of the different risk profiles at local level, while leveraging economies of scale to reduce premium costs. This arrangement allows the insurer to have access to an established network of clients and distribution channels at regional level, while the beneficiaries increase their chances of receiving payouts or support in a rapid manner, given the proximity of the aggregator at local level.

Micro-level insurance refers to mechanisms in which vulnerable individuals and households act as the direct owners of an agricultural insurance policy, paying the premium to the insurer in exchange for a payout in case they are affected by the insured event. This allows for a far greater degree of flexibility and adaptation of the policy to the specific needs, income and level of risk of the individual. Nevertheless, it implies a wide range of challenges for the insurer related to client monitoring, individual claims' evaluation, payout distribution, communication and several other aspects (Le Quesne *et al.*, 2017).

For the purpose of this study, **the following features were identified** from successful case studies of existing insurance schemes that were designed to act as complements to – or vehicles for – shock-responsive social protection interventions:

- » These schemes aim to strengthen the risk management capacity of vulnerable farmers, protecting their livelihoods against large-scale and covariate risks (e.g. natural hazards);
- » They focus on providing coverage to small and medium-sized farmers who would not be able (or willing) to access this kind of coverage through the private sector alone;
- » The nature of these schemes is usually public-private, or purely public;
- » They are heavily supported by the government or other public stakeholders (usually through premium subsidies, awareness raising and capacity building);
- » They are integrated into the frame of a broader social protection strategy, complementing its programmes and objectives.

It is important to underline that this proposed definition can apply to **micro-, meso- and macro-level** insurance schemes; in other words, both in the case where the farmer is the actual, direct policyholder in the scheme, as well as when a national or regional government (or other relevant entity, such as a non-governmental organization (NGO) or development agency) acts as general policyholder, with farmers being the ultimate beneficiary of the coverage.⁶ Box 1 illustrates these three types of modalities for insurance provision more in detail.

1.3. Rationale and methodology of the study

The overall objective of the present study is to provide readers with **an overview of how agricultural insurance and social protection interventions can complement each other**, within the frame of disaster risk management for vulnerable agricultural actors. Specifically, it aims to underline the operational nuances, challenges, opportunities and constraints associated with employing agricultural insurance within social protection systems. Furthermore, it presents a number of **practical lessons learned and considerations** that can be used by relevant public stakeholders (such as local policymakers and development agencies) to introduce aspects of agricultural insurance within programmes and initiatives that seek to strengthen social protection for vulnerable farmers.

The **intended audience of the study** comprises policymakers, development and humanitarian agencies, foundations, NGOs, and other relevant public and non-profit stakeholders that are interested in exploring applications of agricultural insurance as a complement to social protection interventions.

The study is structured as follows: beyond this introductory section, Section 2 of the publication seeks to provide **an overview of the main technical features, opportunities and constraints** related to the implementation of agricultural insurance within developing and emerging contexts. This section includes a

broad analysis of the current state of agricultural insurance globally and its historical evolution, together with a series of technical considerations regarding the different types of agricultural insurance products available, and the challenges associated with ensuring their sustainability in low- and middle-income countries (LMICs).

Section 3 provides a **review of six successful case studies** of agricultural insurance schemes that link to broader social protection programmes, in developing and emerging contexts. The objective of this section is to provide readers with a series of considerations and lessons associated with each case, which can be used to inform future similar initiatives in other contexts.

In line with the definition proposed in the previous section, these case studies were selected according to the following criteria:

1. The insurance scheme analyzed is either public-private, or purely public, in nature;
2. It was established in a low- or middle-income country;
3. It provides large-scale coverage to small and medium agricultural value chain actors ("large-scale" being relative to the size of the country and agricultural sector);
4. The scheme can encompass crop production, livestock rearing, forestry and aquaculture;
5. It preferably employs some kind of digital innovation to overcome common constraints on sustainability;
6. It is inserted in the broader framework of a national social security programme/initiative, or is part of a broader programme of social protection-related interventions carried out by an international development agency;
7. It has achieved substantial results to this date, in terms of sustainability, extension of coverage, speed of growth, overall cost to parties involved and other factors.

⁶ Note that the case studies presented in Section 3 of this publication illustrate experiences related to all three types of such schemes (micro-, meso- and macro-level).

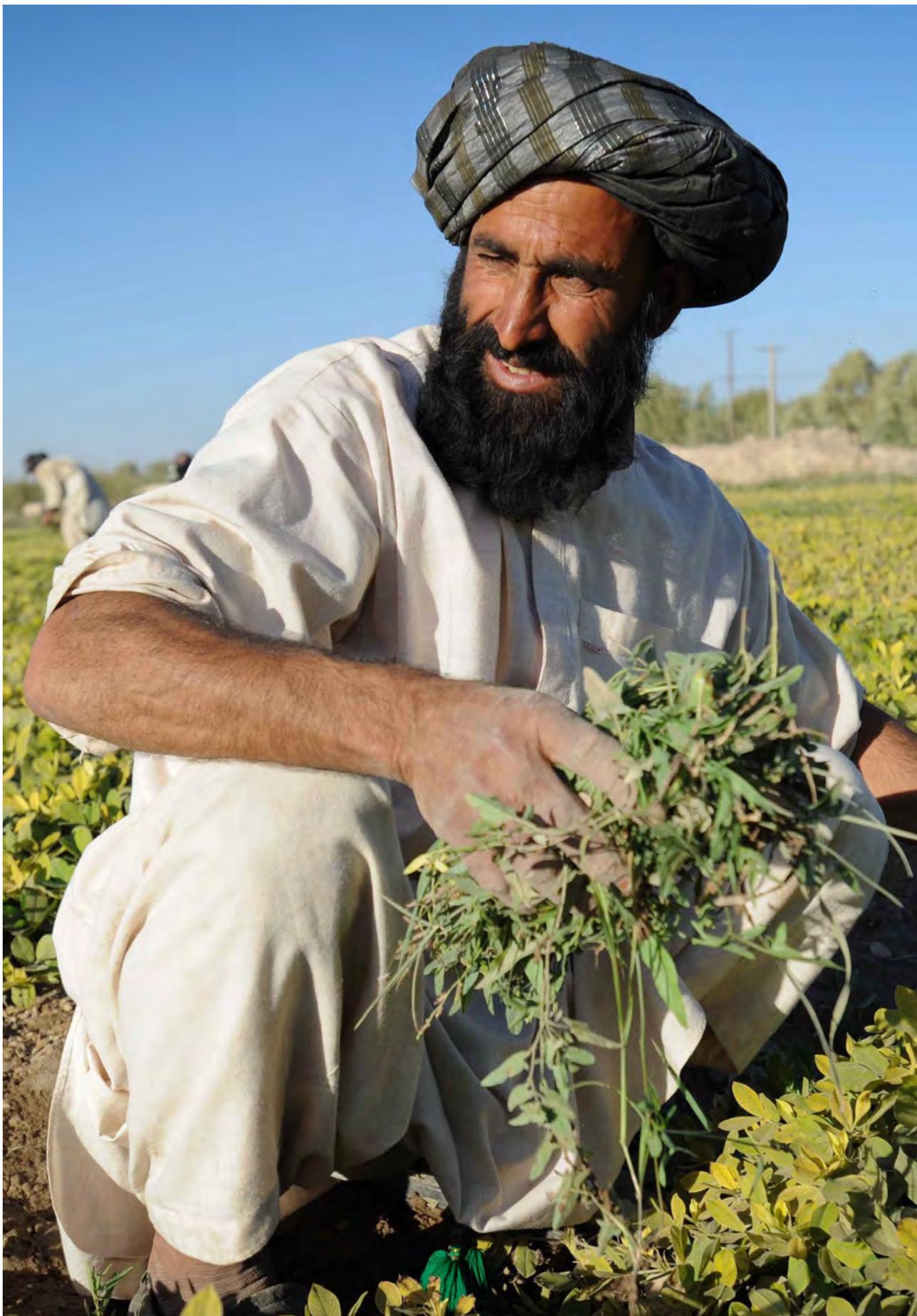


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■ Empty water hole during a drought in the district of Malabane, Mozambique.

Section 4 presents a **series of open questions and points for further discussion** which illustrate the existing (and still unresolved) methodological and practical issues associated with using agricultural insurance as a component of a broader social protection system, within the framework of a general debate on this topic

that is currently engaging different stakeholders – such as international development agencies, governments and academics. Furthermore, it provides a series of considerations relating to **FAO's role and available assets** in implementing agricultural insurance within the frame of its social protection interventions.



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■ Farmer in Helmand province, Afghanistan

Section 2:

Implementing agricultural insurance for smallholder farmers

2.1. The evolution of public agri-insurance schemes in developing contexts

Analyzing the historical evolution of public agri-insurance schemes in developing contexts can provide an overview of the challenges faced by policymakers in implementing this instrument as a public social protection tool on a large scale. Between the 1950s and the 1980s, several countries in Latin America (such as Brazil, Costa Rica and Mexico) and in Asia (such as India and the Philippines) introduced **multiple peril crop insurance (MPCI) programmes** to provide coverage to their agricultural sectors (see Section 2.4.2), usually as a complement to public credit programmes for farmers supporting seasonal production. These programmes were marred by a diverse range of constraints that impaired their efficiency and sustainability, including high administration costs, political interference, moral hazard-related issues and high dependence on public subsidies. While many of these schemes were gradually phased out or drastically reformed starting from the 1990s, the ones that remain (such as in the Philippines) are still heavily subsidized by governments (Mahul and Stutley, 2010).

Starting from the 1990s, the relatively weak performance of the majority of these public schemes led legislators to focus on **fostering collaborations with the private insurance sector** to enable agricultural insurance coverage. This was achieved by supporting the process through the provision of subsidies, reinsurance and a host of

other complementary services to encourage private participation in the sector. The 2000s saw the rise of weather-based **index insurance solutions**, aimed especially at small-scale agriculture, which leveraged the substantial advantages provided by index-based models to enable insurance for client segments that had been so far excluded from this kind of coverage (see Section 2.4.3 for more information on index-based products). The case of India is a good example of this trend: in 1999 the country replaced its traditional public MPCI programme with a national area-yield index insurance scheme – the National Agricultural Insurance Scheme (NAIS) – complementing it over the years with two different iterations of public-private weather-based index insurance schemes⁷ (Ahmed and Mo, 2019; Hess and Hazell, 2016).

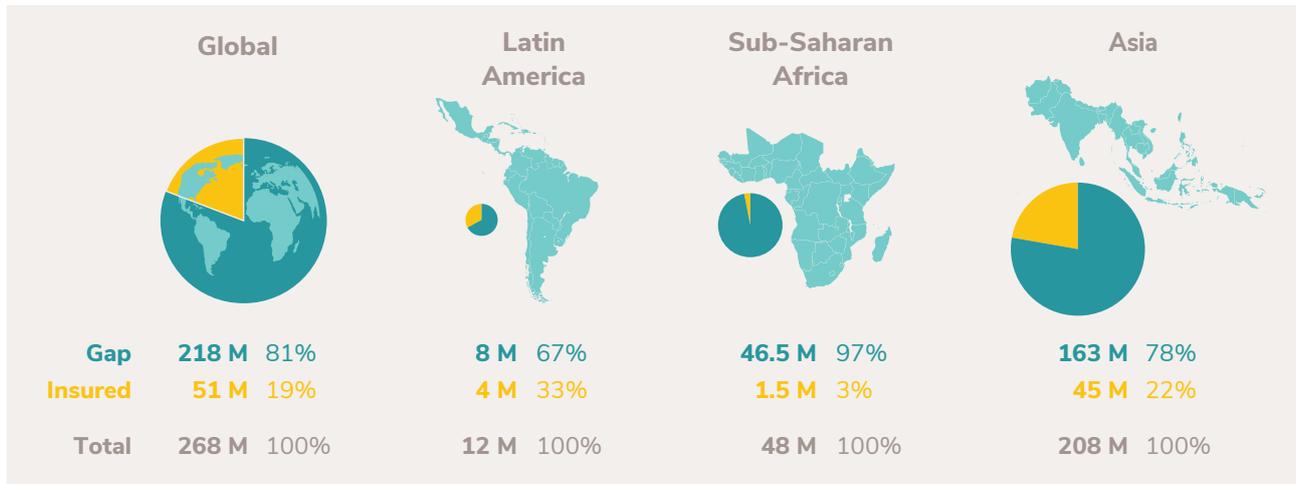
2.2. The current scenario for agricultural insurance coverage in the developing world

In 2018, ISF Advisors carried out an in-depth analysis of the rate of access to agri-insurance coverage for the combined population of smallholders in developing markets.⁸ According to their estimates, **only 19 percent of the target population of 268 million smallholders** currently has access to agri-insurance coverage, which translates into 51 million covered farmers (see Figure 1). In Sub-Saharan Africa specifically, this number is less than 3 percent. Furthermore, of the total covered population, 30 million of those smallholders are based in just one country: India.

⁷ Of these three schemes, the only one still active nowadays is the Pradhan Mantri Fasal Bima Yojana (PMFBSBY), described in more detail at page 25.

⁸ The regions covered include Latin America, Sub-Saharan Africa, South Asia and South-East Asia (note that China is excluded). Note that in this study, in terms of farm size, the definition of “smallholder” refers to a farmer who works on up to 10 ha of land.

Figure 1: Overall and regional gaps in smallholder insurance coverage across regions

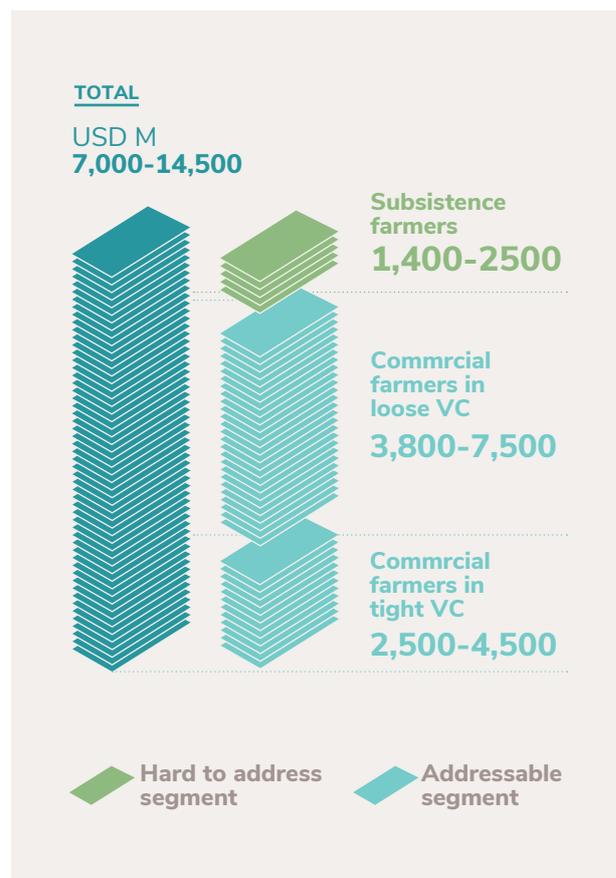


Source: ISF Advisors, 2018.

This leaves an **81 percent gap in insurance coverage** in the developing world, accounting for 218 million smallholders, of which 74 percent (173 million) are based in South and South-East Asia. ISF Advisors estimates that a **total amount of USD 60–80 billion** in insured value coverage⁹ (an annual premium value of roughly USD 7.7–14.5 billion) would be required to extend access to the entire smallholder population in the developing world.

As can be seen from Figure 2, USD 1.4–2.5 billion per year in total premium volume¹⁰ would be required to **ensure coverage for subsistence farmers** in the developing world, who represent an estimated 60 percent of the total smallholder population. This is a segment that is unlikely to be reached and served with an adequate offer of agri-insurance anytime soon, unless product models and their related distribution channels undergo substantial innovation and adaptation to meet its specific necessities, or if these farmers are supported in “graduating” from their current condition (i.e. strengthening their livelihoods so that they are able to afford such products). Furthermore, as can be seen in Figure 3, Asia has the highest level of requirements in terms of the total premium volume needed to provide coverage to the smallholder population, with USD 6–11 billion required on an annual basis.

Figure 2: Premium volumes required to ensure smallholder coverage on an annual basis, by farmer type



Source: ISF Advisors, 2018.

⁹ Please refer to Annex 1 at the end of this publication for a brief glossary of insurance-related terms.

¹⁰ Total premium volume refers to the aggregate premium generated by policies written by insurance companies over a certain area/sector and over a specific period of time.

Figure 3: Regional breakdown of total premium volumes required annually to ensure coverage



Source: ISF Advisors, 2018.

2.3. Challenges in providing agricultural insurance

After having illustrated the extent of the gap in agri-insurance coverage in the developing world, the following sections are dedicated to illustrating the core barriers and bottlenecks that must be overcome in order to facilitate insurance provision to small-scale farmers and other agricultural actors. To begin with, it is essential to note that the agricultural sector (especially in developing contexts) is a sector characterized by **varied and complex risks**, such as climate-, environment- and market-related risks, as well as political risks. In this context, the provision of agricultural insurance, even when only restricted to covering disaster risk, proves to be a complex task which requires substantial levels of technical expertise and engagement not only on the part of the insurer itself (whether public or private), but from all public sector stakeholders whose work relates to agriculture and agricultural financing, such as Ministries of Finance and Agriculture, the Central Bank, regional agencies, the agricultural extension network, the national meteorological service and many more.

Furthermore, it should also be noted that agricultural insurance provided under a social protection frame faces an important bottleneck in the **very nature of its target population**: highly fragmented, small-

scale farming units, whose coverage begets high operational and transaction costs and low individual revenues for an insurance company (especially in the case of micro-insurance provision), in a scenario where substantial economies of scale are required for an insurance scheme to become sustainable.

In light of these complex barriers, which will be analyzed more in detail in the following sections, it is clear that agricultural insurance is a sub-class of the insurance domain that requires careful consideration of **complex design requirements** – as well as issues of delivery, partnership and implementation – to ensure its impact and sustainability. Specific expertise and tailored solutions have to be provided in order to make this kind of insurance sustainable, effective and especially **affordable**, given the low contributory capacity of small-scale agricultural actors in developing contexts, as well as the many risks that threaten agricultural production.

2.3.1. Information asymmetry

Insurers face considerable informational disadvantages when trying to provide insurance coverage to the agricultural sector, caused by: the high fragmentation of rural clients; the complexity of the value chains in which they operate, and of the biological and technical processes that underpin agricultural production;¹¹ the lack of public data on agricultural and weather trends (especially critical in most developing and emerging contexts); and a

¹¹ The complexity of the agricultural sector, its dynamics and context also entails difficult strategic choices for an insurer during the *design phase* of an index-based insurance product. On one hand, designing a product that is extremely specialized and tailored to a single crop or region will most likely impair its potential for further scalability. On the other hand, designing a product that is too generic will increase its *basis risk* (see Annex 1 for an accurate description), thus impairing its efficacy and usefulness.

host of other factors. This information asymmetry begets high transaction costs for any insurance company that seeks to properly assess risks, monitor producers' behaviors, avoid moral hazard and establish prudent underwriting guidelines.

Governments have a vital role to play in mitigating the issue of information asymmetry, for example by enhancing **data availability** for insurers and other key stakeholders (such as modelling and forecasting companies) by investing in public infrastructure. An example of this would be **the establishment of agricultural and weather databases** at regional level that provide regular, up-to-date and granular data on elements such as average yields and rainfall, assisting insurers in designing and managing agricultural insurance products that are suitable for the specific context. This is particularly important given that the majority of developing countries nowadays still lack a dense network of weather stations at regional level that can provide the real-time and historical data required to enable index insurance solutions (see Section 2.4.5).

Investing in the **human capacity development** of a country's public sector also represents a fundamental contributing factor towards reducing information asymmetry and enhancing data availability. This is done by ensuring that adequate public expertise is developed over time for a range of insurance-related areas (e.g. statistics, weather data analysis, actuarial analysis¹²).

2.3.2. Adverse selection and moral hazard

Adverse selection and moral hazard are two typical challenges caused by information asymmetries that constrain the involvement of insurance companies in agriculture, and they tend to be especially critical in developing contexts.

Adverse selection occurs because those farmers who are most exposed to natural hazards are also those who will normally be most tempted to apply for

an insurance policy, which means that the risk level of the insured population will be higher on average than that of the general population. Insurers have to take this aspect into careful consideration, either by raising the cost of the premiums or by expanding their coverage base to include less risky clients.

Moral hazard is also a major challenge: farmers might be encouraged to make risky production choices – such as cutting costs by using cheaper and less effective fertilizers, or experimenting with new crops that might not be the most appropriate given the climate and terrain conditions – because of the protection afforded by the insurance policy. Nevertheless, different strategies can be enacted by insurance companies to curb these kinds of behaviors. For example, they could impose a **deductible** in the policy, which implies that the policyholder has to bear part of the total loss (a deduction on his or her insurance payout) – either a fixed amount or a percentage. Another solution is a **no-claim bonus**, by which the farmer receives a discount on the insurance premium for every year in which he or she does not submit a claim for reimbursement.

2.3.3. Systemic risk

The agricultural sector in general is highly exposed to systemic risk, a typology of risks that simultaneously affects a large number of economic units – such as farms – and cannot be mitigated through diversification.¹³ Examples of this include natural hazards (e.g. droughts, floods, hurricanes) and plant disease epidemics. This kind of risk can generate substantial and abrupt losses for the agricultural coverage portfolio of an insurance company, and – in the case of an infrequent but large-scale natural disaster – it can critically threaten the financial solvency of an insurer. **As a result, access to international reinsurance services** becomes an important precondition to ensure the expansion and scalability of agricultural insurance schemes (see Section 2.3.7).

¹² *Actuarial*: describes the calculations made by an actuary. This is essentially a branch of statistics, dealing with the probabilities of an event occurring. Actuarial calculations require basic data over a sufficient time period to allow for the likelihood of future, risky events to be estimated with a reasonable degree of certainty. Please refer to Annex 1 at the end of this publication for a more detailed glossary of insurance-related terms.

¹³ As opposed to *non-systemic risk*, which only affects a diminutive number of economic units and can usually be eradicated through diversification, barring extreme events. Please refer to Annex 1 at the end of this publication for a more detailed glossary of insurance-related terms.

In most cases, the notion of systemic risk will prevent private insurance providers from engaging with the agricultural sector (especially in developing contexts) unless reinsurance is readily available (see Section 2.3.7) or the government provides adequate support and incentives. In fact, **systemic risk is one of the core reasons used to justify governmental intervention in agricultural insurance**, either through heavily subsidized public coverage programmes, or through a public-private collaboration that can properly incentivize private insurers' participation and transfer part of the risks they face onto the public counterpart. Section 2.6 provides more information on the possible advantages that can be derived from implementing agri-insurance through a public-private collaboration.

2.3.4. Limited insurance culture among farmers

Farmers in developing contexts often have a limited understanding of the benefits that can be derived from agricultural insurance, thus approaching this financial product with a variety of attitudes which can range from perplexity to outright suspicion. Small- and medium-scale farmers in particular commonly perceive insurance as a costly and unprofitable financial product that demands regular annual payments on their part (i.e. the premium) in exchange for a potential indemnity payment following an infrequent event that might not happen in years (i.e. the natural hazard). This is a well-documented¹⁴ type of **cognitive failure**: farmers tend to be very well aware of the common risks threatening their production, but, on the other hand, tend to **underestimate the likelihood of an extreme natural event**.

In this sense, governments have an essential role to play in addressing farmers' doubts and concerns over the benefits and challenges of agri-insurance, raising their awareness of its potential to safeguard their livelihoods following a catastrophe, and overall fostering the engagement of the private insurance sector in agriculture through incentives and collaborations. Widespread suspicion and a lack of familiarity with this product are often core barriers to a scheme's uptake and sustainability.

Building trust in and awareness of insurance as a financial product among farmers is a critical task

that governments should undertake to ensure that there is adequate uptake of an agricultural insurance scheme – which can be achieved through awareness campaigns, financial literacy training and several other types of interventions.

2.3.5. Weak or absent enabling framework

An enabling legal and regulatory framework plays a critical role in governing the development of all types of insurance in developing and emerging contexts, including – and especially – agricultural insurance. There are several essential elements that should be guaranteed by the regulator to ensure the stability, fairness, transparency and inclusive growth of a national agri-insurance sector. While the analysis of all possible factors that contribute to an enabling legal and regulatory environment goes beyond the scope of this study, several of the most important ones can be mentioned. From the side of the offer of agricultural insurance products (i.e. the insurance companies), the following can be cited:

- » A solid regulatory framework that guarantees **contract enforcement**, in the absence of which it will be quite hard to encourage any private insurance provider to engage in a sector as complex and challenging as agriculture;
- » A **supervisory financial entity**, charged with overseeing the national insurance market, **that is accountable, transparent, and able to carry out its job effectively**. This is essential to ensure the proper arbitration – and stability – of the sector even when confronted with potentially crippling events (e.g. bankruptcy of major insurance players, monopolistic mergers, widespread embezzlement), as well as the continued confidence of all stakeholders in the fairness and transparency of the system;
- » **International regulatory standards**, whose compliance should be enforced by the regulator for all public and private players engaged in the agri-insurance market. Ensuring this, in particular, increases the chances that local insurers will be able to access international reinsurance services to offset some of their risk (Hess and Hazell, 2016).

¹⁴ See, for example, Dercon (2004), Skees (2008) and Mahul and Stutley (2010).

From the side of the demand for agricultural insurance (i.e. the smallholders and other agri-value chain actors), the following types of measures can be mentioned as conducive towards an enabling environment:

- » Policies that foster the **inclusivity** of the framework, meaning provisions, incentives and initiatives to gear the offer of private agricultural insurance towards vulnerable and marginalized client categories (including low-income individuals, those who are illiterate, and rural women and youth, among others). Without these incentivizing measures, only the wealthiest actors in the agricultural sector, such as large agribusiness conglomerates, would be able to access a range of suitable insurance service to protect their operations;
- » Regulations covering aspects of **financial consumer protection**, which are fundamental to address, among other aspects, contract disclosures, fair treatment of clients and data privacy, as well as providing options for redress to clients in case of unfair service provision;
- » Provisions to ensure minimum levels of **literacy and financial education** for low-income agricultural actors, with a view to guaranteeing that these financial clients have the capacity to properly assess the opportunities, obligations and features of the agricultural insurance products offered to them, thereby allowing them to make the best possible decisions for their business and livelihood (as well as to recognize predatory insurance practices);
- » Policies that **integrate** agricultural insurance provision within national social protection strategies, clearly setting goals for outreach, access, coverage and uptake.

Beside the legal and regulatory considerations, creating an enabling framework also requires **extensive public investment in infrastructure**. A clear example of this is the public infrastructure

for the gathering of weather-related data, such as a network of weather stations spread across a given country or region, managed by the national or regional meteorological service. These stations would be able to provide the historical and real-time weather data that is required to design and price weather-based index insurance products, as further detailed in Section 2.4.3.

2.3.6. High technical requirements on the part of the insurers

In order to design adequate and profitable insurance products that can satisfy the needs and requirements of both the insurer and the farmers, insurance underwriters need substantial expertise in agriculture and its associated risks. This implies understanding the (not always straightforward) cause-and-effect relationships in agricultural production models,¹⁵ and having the capacity to distinguish between insurable and non-insurable risks that could affect agricultural production. Furthermore, substantial technical capacity is also required on the part of the insurer in order to understand the current management practices of the insured producers, and eventually provide its support in improving these practices.

Achieving all of this requires an in-depth knowledge of the biological, environmental and technical processes that underpin the agricultural cycle across its different sub-sectors, together with the economics of farm production, and the linkages and dynamics within specific agricultural value chains. This is why established insurance companies usually either create **specialized in-house technical units that focus specifically on the agricultural sector** or outsource the underwriting to companies that specialize in it. For a private insurance company, developing this expertise can take years of trial-and-error, and one bad experience can discourage any further attempt at expanding into the agricultural sector. Furthermore, these considerable technical requirements compound the high administrative and transaction costs that insurers have to face when engaging with the agricultural sector, especially in developing and emerging contexts (Iturrioz, 2009).

¹⁵ In other words, being able – as an insurer – to properly establish the causal connection between the damage incurred by the farmer's yields or assets and one or more materialized risks (i.e. the perils).

2.3.7. Challenges in accessing international reinsurance

As already mentioned in Section 2.3.3, risk diversification is quite challenging to achieve for agricultural insurers, due to the high likelihood of an extreme event affecting a significant share of its portfolio at once. That is why insurance companies seek insurance themselves, by transferring part of their portfolio risk to large-scale **international reinsurance companies** in exchange for a premium. Without reinsurance (or government support), the premiums would have to be set at a very high level in order to allow the company to cover potentially large and systemic losses. Given its complexity (and in much the same way as insurance), it takes substantial skills and expertise to underwrite agricultural reinsurance. Apart from risk transfer, re-insurers may also provide advisory services to insurers regarding product development, as well as on various aspects of risk management (such as risk assessment, modelling, pricing and structuring) (Hess and Hazell, 2016).

Accessing reinsurance services is especially challenging in the agricultural sectors of developing contexts, as global reinsurers usually struggle with the **small business volumes and lack of available data** associated with these markets, as well as various regulatory impediments (ISF Advisors, 2018). From the perspective of the international reinsurers, carrying out the necessary due diligence in these markets implies very high transaction costs. Nevertheless, these international actors have become quite engaged in recent years in the agricultural markets of emerging countries such as China and India, where the large scale and relative sophistication of public agri-insurance programmes provides enough premium volume and stability in demand to underpin their business case and justify these actors' involvement.¹⁶

In the instance that the private international reinsurance sector is unwilling to provide its backing to private insurance companies in agriculture, the government can step in to either subsidize part of the risk loading cost¹⁷ for the insurers or offer subsidized reinsurance. Examples of countries that rely exclusively on publicly provided reinsurance include Costa Rica, Iran, Japan and Kazakhstan (Hazell, Varangis and Sberro, 2017). Section 2.5 illustrates in more detail the possible roles that the public sector can play in this regard.

2.4. Typologies of agricultural insurance

Agricultural insurance is a complex domain, with different types of products having been developed to adapt to different contexts and risks. Providing these kinds of financial products to developing and emerging contexts requires customized solutions that can overcome or mitigate the environmental constraints to insurance delivery, uptake and sustainability. In this regard, **two main categories of agricultural insurance products** can be defined, which present significant differences in their risk assessment processes, product design features and loss-adjustment procedures: 1) indemnity-based products and 2) index-based products. These categories are analyzed in Table 1, as well as more in detail in the next sections:

¹⁶ As will be seen in Section 2.4.3, the rise of index-based insurance solutions in recent years has contributed to the partial mitigation of the data-related constraints faced by international reinsurers in developing agricultural sectors, as these products rely on objective and transparent data sources to establish when policyholders should receive a payout.

¹⁷ Risk loading costs are additional margins to the premium added by the insurance company when underwriting specific policies that present high risk profiles, such as agricultural insurance for smallholder farmers. An example of these additional costs is the *uncertainty load*, which is a margin to compensate the insurer for limited information or uncertainty associated with catastrophic insurance. For agricultural insurance policies that cover large, infrequent events in countries where the quality of data is poor, the uncertainty load can turn out to be a significant component of the premium (Mahul, 2012).

Table 1: Categories of agricultural insurance

Category	Features	Types of insurance	Core constraints
Indemnity-based products	<p>Compensation is based on the measured loss or damage suffered at the level of the individual farm or herd</p> <p>They require direct on-farm damage assessment and individual visits to set up the policies</p>	<ul style="list-style-type: none"> » Named peril crop insurance » Multiple peril crop insurance 	<p>High administrative and operative costs make provision to smallholders challenging</p> <p>Exposed to issues of moral hazard and adverse selection</p>
Index-based products	<p>Parametric: the indemnification is not based on the actual loss experiences, but on a pre-defined amount set by contract that depends on the value of a defined index</p> <p>Based on indirect indicators at regional level, built on historical data; there is no individual assessment at farm-level</p> <p>Reduced administrative and operational costs make them better suited for smallholder provision</p> <p>Standardized: all farmers in an area receive the same policy, and benefit from the same payouts in case these are triggered</p>	<ul style="list-style-type: none"> » Weather-based insurance » Area-yield insurance » Remote sensing solutions (e.g. NDVI satellite livestock insurance, see Section 2.4.5) 	<p>Prevalence of basis risk, i.e. deviations between the events registered at regional level by the index and what actually happens to the individual farm</p> <p>Require granular and updated data (e.g. on yield, rainfall) to build the index and run the scheme</p> <p>High inputs required in the development phase</p>

Overall, indemnity-based schemes are more common in emerging countries **with strong public welfare systems, developed agricultural markets, and larger farm sizes on average**, such as in Latin America, Eastern Europe and Central Asia. Index-based products, on the other hand, are starting to become increasingly popular in developing contexts where indemnity-based solutions are challenging to implement, such as in South and South-East Asia, as well as Sub-Saharan Africa. Thanks in particular to the rise of index-based schemes, agricultural insurance has seen a substantial expansion in the

past ten years, with two countries being at the forefront in terms of coverage: China (160 million farmers covered) and India (30 million).

In the frame of large-scale and sophisticated agricultural insurance programmes, it is not uncommon for different types of insurance products (i.e. both indemnity- and index-based) **to be offered as part of the same scheme**, as they allow to protect specific crops and regions against different risks. The case of the “Component for the attention to natural disasters” (CADENA) scheme in Mexico, detailed in Section 3.5, is a good example of this concept.

2.4.1. Named peril crop insurance

Named peril crop insurance (NPCI) provides coverage against a number of specific adverse events that are explicitly listed in the policy. The indemnity claim is calculated by directly assessing the percentage of the damage caused by the natural event to the field, shortly after it has occurred. Several features of NPCI should be underlined:

- » The insured amount is defined upon signing the insurance policy. It can be based either on the production cost incurred by the farmer, or the anticipated value of the crop;
- » NPCI is normally less exposed to issues of moral hazard compared with MPCI (see next section), because the damage it covers is unpredictable and hard to avoid with improved farming practices, and it is easier to correctly assess the cause of the loss. As a result, farmers would find it considerably more challenging to “game the system” with named peril coverage, as it is difficult to try to attribute unrelated losses on the farm to the named peril that is actually insured (Mahul and Stutley, 2010);
- » A deductible (expressed as a percentage) is commonly applied by the insurer to the compensation owed to the policyholder, which implies that the insured has to bear part of the loss. From the insurers’ perspective, having the farmers assume some share of the risk in the insurance arrangement (i.e. shoulder part of the potential financial loss caused by a perilous event) is meant as a behavioral incentive towards adopting better risk management strategies in production and business practices, while reducing the incidence of false claims;
- » NPCI is commonly used to protect crops against hail damage, but can also be complemented with coverage for other specific risks (such as fire, frost or wind), as long as they are not systemic (i.e. correlated) in nature. It is usually employed in sub-sectors of agriculture such as horticulture and floriculture, as well as livestock and forestry (Iturrioz, 2009);

- » Given that its premiums are usually considerably lower than multiple peril crop insurance (see next section), it is rarely subsidized by governments, and it is usually offered by the private sector alone;
- » In the case that the damage cannot be properly gauged in the aftermath of the disaster, its assessment would have to be deferred until later in the agricultural season, which can further complicate the insurer’s job of correctly evaluating the extent and cause of the damage incurred (Iturrioz, 2009);
- » Named peril coverage accounts for a significant portion of the overall insurance coverage worldwide. According to a World Bank survey (Mahul and Stutley, 2010), some version of this product is present in all high-income countries, and in 50 percent of low-income countries. In particular, named peril insurance against hail damage has a long history – and is considerably widespread – in European countries.

2.4.2. Multiple peril crop insurance

Multiple peril (yield-based) crop insurance (MPCI) is another type of indemnity-based product that covers farm production from all kinds of perils, except those that have been explicitly excluded by the insurance contract. MPCI provides a guarantee that is usually between 50 and 70 percent of the expected yield of the producer, estimated according to their production history and the region where the farm is located. The payout is given when the actual yield of the product falls short of the (expected) value agreed by – and guaranteed – in the policy, and it is equivalent to the difference between the actual yield and the yield guaranteed.

While MPCI provides substantially more comprehensive coverage than named peril insurance, it can also carry higher costs which, nevertheless, are actually a function of the specific risks that crops/livestock are exposed to. Similarly to NPCI, the premium associated with an MPCI contract for an individual producer can reach as much as 20 percent of the sum insured,¹⁸ according to the

¹⁸ *Sum insured* refers to the amount specified in the policy up to which the insurer will pay indemnities should the insured peril(s) occur and result in a loss to the insured property.

size and location of the farm, the types of crops covered and the amount of coverage provided. This high set premium does not account only for the comprehensive level of coverage granted, but also for the high operational costs related to performing on-farm pre-inspections and loss assessments. Furthermore, the training of competent loss adjusters¹⁹ considerably raises costs for an insurance company (which are reflected in the premium), given the complexity of the tasks to be performed and the number of agents required. Finally, settlement claims for MPCI are usually slow, as they require individual farm visits for a large population of farmers spread across vast areas.

Furthermore, the high premium also includes the considerable expenses faced by the insurer to reduce moral hazard, for example by ensuring regular monitoring the farmers and performing risk inspections. Moral hazard is, in fact, one of the main challenges associated with MPCI, stemming mainly from the covariate nature of the causes that can contribute to a lower yield (which can include both adverse natural events and bad management) and which are often hard to disentangle for the insurer. That is why most large-scale MPCI programmes have historically been **heavily subsidized by governments**, and why small-scale and vulnerable farmers have usually been unable to benefit from them (Mahul and Stutley, 2010).

As detailed at the beginning of Section 2, large-scale public MPCI programmes were popular around the world between the 1950s and 1990s, especially in Latin America (e.g. Brazil, Mexico, Costa Rica) and Asia (e.g. India, the Philippines). Nevertheless, starting from the 1990s, most governments began to gradually phase away from these kinds of schemes, as they were deemed unsustainable and ineffective, favoring instead collaborations with the private insurance sector in which the policymakers repositioned themselves into more of a supportive and enabling role. Starting from the 2000s, the public focus increasingly shifted towards **index-based insurance solutions** that allowed governments to overcome the negative incentives associated with

MPCI; to reduce administrative costs; and to enable agri-insurance provision for large segments of small and vulnerable farmers that had been so far excluded from accessing these kinds of products (Mahul and Stutley, 2010).

The case of CADENA in Mexico (see Section 3.5) is a good example of this transformation: the Mexican government initially ran a large-scale MPCI programme in the 1980s, under the “National Crop and Livestock Insurance Company” (ANAGSA), which eventually became too expensive and draining for the public budget. In the 1990s, the government then converted it to a public insurance company called *Agro-Aseguradora Mexicana* (AGROASEMEX), which had the mandate to foster the creation of a **public-private insurance market for agricultural insurance** in the country. In 2003, AGROASEMEX became the public insurer counterpart in a very successful national public-private scheme (CADENA), which employed a combination of index-based and conventional insurance products to provide insurance coverage against natural hazards to 3.7 million smallholders across the country.

2.4.3. Index-based insurance (Weather index)

Index-based insurance was developed to overcome several of the limitations typically faced by indemnity-based instruments, particularly those related to moral hazard and distorted incentives on the part of farmers. By adopting an index-based insurance model, the parties agree on an objectively measurable, independent indicator (the index), which has a high degree of correlation with farm yields or other agri-related outcomes. To be valid, the index has to be strongly correlated with events that influence productivity or income. Example of variables to be indexed include rainfall, temperature and livestock mortality. Payouts to farmers are triggered by deviations above or below a specific threshold measured on the index. Being a form of **parametric insurance**, the payouts do not indemnify the actual loss experienced by the farmer, consisting instead of pre-defined amounts that get disbursed in case that the set threshold on the index is crossed.

¹⁹ A *loss adjuster* is an agent of the insurance company, or of a third party, charged with determining the amount of damage and loss covered by the insurance policy. They are required to investigate, negotiate and settle disputed claims, visiting the site of the loss in order to gather evidence and assess damage.

A common application of this concept is **weather index-based insurance**, which allows agribusinesses or farmers to hedge the risk of weather-related losses. As a practical example, data from a weather station could be used to measure a specific weather variable at a regional level (e.g. rainfall, seasonal temperature) over a set period of time: payouts are triggered in the eventuality that the measured values fall below (or rise above) the thresholds set in the insurance policy (FAO, 2015).

Index-based models have certain advantages compared with conventional insurance, allowing for greater flexibility when designing and implementing coverage programmes. The following is a summary of the most important advantages associated with this category of products:

- » Index-based insurance is not as susceptible as traditional insurance to issues of moral hazard and adverse selection: it is assumed that neither the insurer nor the policyholder have more advantageous information on the underlying index which might be exploited by one of the two sides, and neither of the two sides can affect the index in any way. When the index is developed at a regional level, the insured farmer has the same incentives towards carrying out good agricultural practices as the uninsured farmers (FAO, 2015);
- » Administrative and operational costs are lower compared with conventional insurance. Since the quantification of indemnity is solely based on the realized value of the underlying index, there is no need for direct on-field assessment of the actual yield losses, or farm inspections. As a result, payouts can be delivered more quickly and with lower associated expenses;
- » Unlike traditional insurance contracts, there is no need to classify individual policyholders according to their level of exposure. Furthermore, given that

these products are quite standardized in nature, they are easier to bundle with other financial services (such as credit or savings), and can be delivered through aggregators (IFAD, 2017);

- » Payouts can be structured in different ways, ranging from a simple lump sum approach – in which the payout is triggered in its entirety once the index has gone over or below a certain threshold – to a continuous payout function that foresees increasing levels of payment depending on the extent to which the index threshold has been crossed;
- » Reinsurance can be obtained more easily, as the index-based insurance model are built on objective, transparent and usually public data. The lack of transparent and reliable data is one of the main factors that discourage international reinsurance from engaging with developing agricultural sectors²⁰ (IFAD, 2017).

Despite having being widely hailed by the development community as a “silver bullet” which can prove especially useful to enable large-scale coverage for smallholders, who are traditionally excluded from conventional insurance, the reality is that index-based models face **considerable challenges to their design and uptake:**

- » The main issue to deal with when developing an index-based model is that of **basis risk**: an insufficient degree of correlation between the yield losses incurred by the farmer and the index chosen to measure losses and payouts. This mismatch in correlation could result in farmers incurring losses without receiving a payout, or farmers receiving insurance payouts while suffering no actual loss²¹ (FAO, 2015);
- » Another critical issue lies in ensuring that farmers properly understand the concept of basis risk,

²⁰ As already illustrated in Section 2.3.7, lack of access to international reinsurance represents one of the core constraints on the development of competitive and sustainable private agri-insurance markets in developing contexts, as it results in local insurers being unable to transfer part of their risk to international markets. From the policymaker’s perspective, these considerations present a strong argument for carrying out long-term investments in the national data gathering infrastructure and public research on index insurance modelling, with a view to enabling index-based insurance solutions for their specific contexts.

²¹ Please refer to Annex 1 at the end of this publication for a more detailed explanation of basis risk in insurance and financial capability, as well as other insurance-related terms.



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■ Young farmer in a flooded rice field, the Philippines.

while also having the **financial capability**²² to withstand the consequences of (potentially) not being reimbursed even if they do experience a loss. A lack of clear communication on the concept of basis risk and the implications of index insurance can lead to substantial reputational damage for the insurer, in the instance that the farmers do not understand why the damage they received did not trigger a payout;

- » The country where the scheme is established must be able to provide a strong public data-gathering infrastructure that allows proper measurement of the index, such as a **network of weather stations** at national, regional and local level that can provide real-time and historical weather data in a granular manner. This is a critical constraint in many LMICs, where governments have not yet invested in the required infrastructure;
- » Although operational and administrative costs are lower overall than with MPCl, there is a **high initial investment required on the part of the**

insurer to construct the index and the underlying insurance model. Furthermore, the required initial investment from the government could also be high if weather stations need to be installed. Overall, if the public sector is already providing relevant historical weather data, as well as the data-gathering infrastructure, the resource and time investment for the insurer will be strongly reduced;

- » It is usually necessary to leverage pre-existing agricultural aggregators (e.g. offtakers) to ensure that index-based insurance products directed at smallholders are able to reach scale and sustainability. This implies bundling these products with complementary services (both financial and non-financial) such as credit inputs and/or information services provided by aggregators, in order to mitigate the high operational and administrative costs associated with distribution (see Box 2 on the next page for further consideration of the bundling of insurance with other services).

²² *Financial capability* is defined as the combination of attitude, knowledge, skills and self-efficacy needed to make and exercise money management decisions that best fit the circumstances of one's life, within an enabling environment that includes, but is not limited to, access to appropriate financial services (Center for Financial Inclusion, 2013).

Box 2: The importance of bundling insurance with financial and non-financial services

As stated by Prashad (2016), setting farmers' livelihoods on a dynamic path of improvement requires a strategic combination of both financial and non-financial services, in which agricultural insurance acts as one synergic component of a broader offer of services (such as input provision, market linkage facilitations and training on good farming practices) that can engage all segments of an agricultural value chain.

Several combinations of this bundling approach are possible, such as linking insurance with credit provision, weather forecast services, input supply for farmers, and many more. The cases of PROAGRO-Mais in Section 3.4 and the R4 Initiative in Section 3.6 are good examples of service bundling strategies that include an insurance component.

The advantages that can be derived from bundling insurance with other services are plenty. To cite but a few:

- » Insurers can leverage the distribution channels and agent networks of the other service providers to increase their outreach, **while reducing costs for distribution and customer education**;
- » Service providers that collaborate with the insurer see their client risk reduced by the insurance coverage, while benefitting from a potential additional revenue stream – the incentives provided by the insurer;
- » Farmers gain access to a potential “one-stop shop” that provides them with multiple services, while leveraging the insurance coverage to gain easier access to credit, input provision and other services.

As providing agricultural insurance as a standalone product is usually a rather challenging and costly endeavor, especially in new markets where familiarity with such instruments is low, bundling can prove to be a key enabling approach to reach those levels of affordability and outreach that are needed to make these services sustainable. Nevertheless, it must be noted that this bundled service offer should always be **value-aligned**, i.e. it should not only make sense for the insurer and other service providers from a business perspective, but also offer a concrete added value to farmer clients, in terms of increased affordability, ease of use and other benefits (Prashad, 2016).

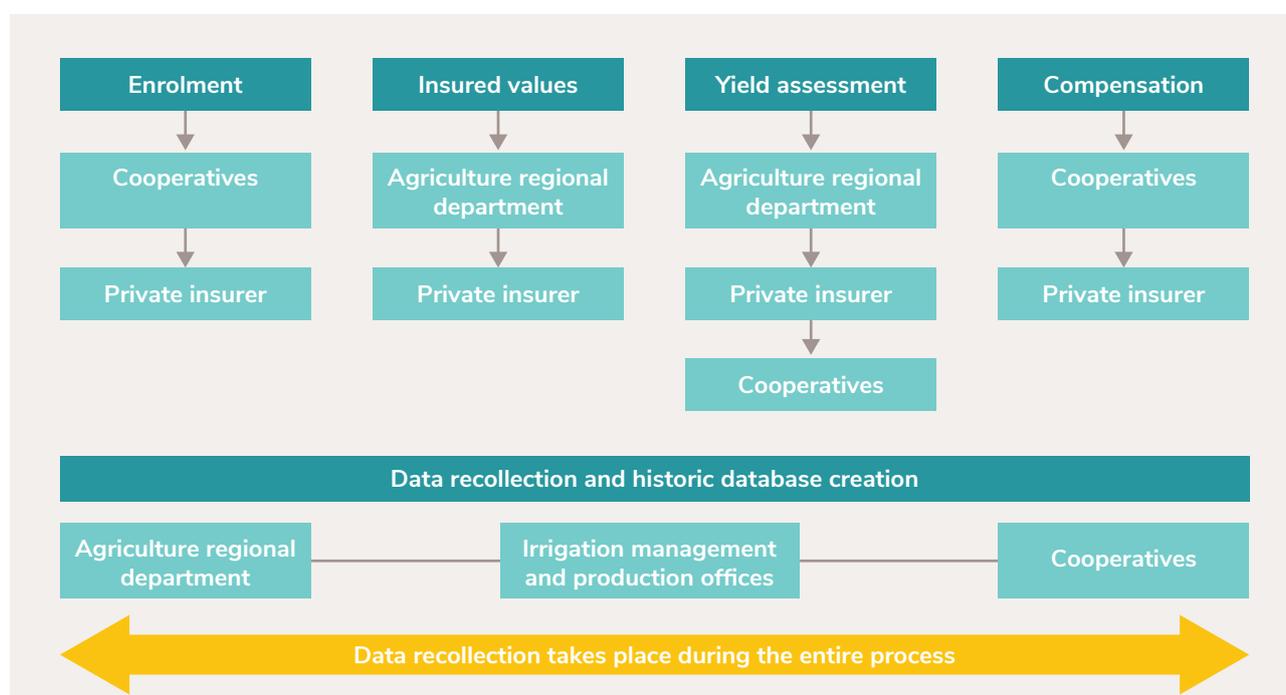
2.4.4. Area-yield index insurance

In this kind of index-based coverage, indemnities are based on the **realized (harvested) average yield** of a particular crop grown in a specific production zone, such as a county or district. This realized average yield is compared with an average historical yield of that same zone based on historic datasets. The insurance policy guarantees a yield amount that is established as a percentage of the historical average yield in the area, usually in the range of 50–90 percent. If the realized average yield falls below the amount guaranteed by the policy (i.e. is considerably lower than the historical average yield), then all farmers in that production zone receive a payout, **regardless of the actual yield** they experienced on their individual farms (FAO, 2015).

This type of index insurance requires **historical area-yield data** from which the normal average yield and insured yield can be established, hence public support and investment in data-gathering infrastructure is key to enable these kinds of insurance products. The premiums are based on a risk analysis carried out on the historic datasets. The area selected is usually at a level large enough to avoid collusion²³ and small enough to properly represent the physical and market conditions of a group of farmers. Figure 4 presents a possible management process for a public-private scheme of this kind, illustrating the potential roles played by the different stakeholders.

²³ This refers to a scenario in which farmers agree among one another to artificially keep yields down to receive payouts from the scheme, while also saving on inputs and labour. The higher the number of farmers, the harder it is to sustain a collusive arrangement, since a non-colluding producer could maximize his or her individual yield and still obtain the benefits of the higher indemnity brought about by the actions of the colluding producers (Miranda, 1991).

■ **Figure 4:** Stakeholders' roles in a basic management process for an area-yield insurance scheme



Source: adapted from Boudreau, 2016.

As with any type of index-based insurance, area-yield products are subject to **basis risk**: since the coverage is based on the regional realized average production, and not on the individual farm's yield levels, a farmer could receive compensation even if his or her yield was good, or not receive compensation when the yield was sub-par. Indirectly, this also means that farmers are encouraged to implement the best agricultural management and production practices at their disposal, as this gives them the chance to earn a good yield and, on top of that, a payout from the insurance scheme if the area average yield falls below a certain level (World Bank, 2005). See Annex 1 at the end of this document for more information on basis risk.

Overall, it should be noted that the choice between weather and area-yield index insurance to protect smallholder farmers is **highly context-specific**, dependent on the specific risk exposure faced by the production activity under consideration. On one hand,

area-yield index insurance is capable of providing a broader coverage, and may thus be viewed as a more comprehensive tool. On the other, weather index-based insurance can be easier to operate – provided that quality weather data is available – and could be the most suitable option in cases in which the risks threatening production are essentially weather-related.

2.4.5. Remote sensing insurance applications

A variety of applications of **remote sensing technology** (such as satellite imagery, manned aircrafts, ground sensors) allow insurers to collect different types of datasets on the state and evolution of agro-hydrological variables over a specific area (such as cloud temperature, vegetation indices, soil moisture content, evapotranspiration), which can then be used to create specific indices around which parametric insurance models can be developed.²⁴

²⁴ An interesting case of a system that could be used to develop a remote-sensing based index for crop insurance at country level is FAO's Agriculture Stress Index System (ASIS). ASIS uses satellite-based remote sensing data to detect agricultural areas (cropland or grassland) with a high likelihood of water stress (dry spells and drought). It simulates the analysis that an expert in remote sensing would undertake, while also simplifying the interpretation and use of the data for users who are not remote sensing experts. The system allows countries to fine-tune parameters of the system based on detailed land use maps and national crop statistics. The ASIS global website, available in six languages, went online in 2014. It provides analysts with updated indicators every 10 days at the global level and for 196 countries (Hernández, 2018).

These indices can act as **proxies for a variety of agriculture-related outcomes**; for example, insufficient soil moisture content – as gauged by the relative index – results in lower crop growth and scarcer yields for farmers. In an insurance model built on such an index, payouts to farmers would be triggered in case the index measurement fell below a set threshold, which would imply that these actors have experienced a loss on their yields. Although applications of this technology in agricultural insurance have so far been mainly limited to the public sector, the concept has begun to attract substantial interest from private insurers in recent years (IFAD, 2017), given the multiple advantages it brings:

- » It allows the assessment of the state of specific natural dynamics that would be impossible or extremely challenging to evaluate from the ground (such as pasture growth);
- » It allows the eschewing of the substantial operational costs that would be associated with gathering data from the ground, for large swaths of land;
- » It allows the collection of considerable amounts of up-to-date data over vast regions, on a frequent basis and over long periods of time;
- » It allows the analysis of the evolution of vegetation and climate trends over the years, allowing the refining of the insurance product on the basis of continuous observation;

Normalized Difference Vegetation Index (NDVI) livestock insurance is a well-known application of this concept. It is used mainly to evaluate damage to livestock following drought events that influence forage conditions, by using the **state of pasture growth of a specific area** as a proxy, assessed through satellite imagery. If the pasture has not grown adequately, it is assumed that the livestock will suffer due to insufficient forage. Pasture growth is challenging to assess from the ground, due to continuous livestock grazing and the different grazing management strategies adopted.

Satellite imagery is used to capture the state of pasture growth of a specific area over time, with the aim of building a historical time series. From these

measurements, and through specific algorithms, it is possible to determine the value of the NDVI, which provides a snapshot of the state of pasture growth over a specific area. In the instance that, in a specific year, the NDVI falls below a specific threshold, a payout will be triggered for the insured pastoralists who use those pastures to feed their livestock. The Kenya Livestock Insurance Programme (KLIP) scheme (covered in Section 3.1) is a good example of a large-scale index insurance programme which uses an application of an NDVI to enable large-scale insurance coverage against drought risk for more than 80 000 small-scale herders.

2.5. The role of the public sector in enabling agricultural insurance as a social protection tool

When analyzing the reasons behind the failure of many large-scale agricultural insurance schemes (especially index-based ones) in developing and emerging contexts, it becomes clear that a core challenge on the policymakers' part is **methodological**: excessive focus is given to the design of the best possible insurance product, without first ensuring that the necessary contextual conditions are in place to support its expansion.

Hence, in developing and emerging contexts, the adoption of a **system-based approach** or strategy should be the first step towards linking agricultural insurance and social protection: the creation of an enabling environment (in terms of regulation, institutions, client demand and infrastructure) at macro-, meso- and micro-level, in both the agricultural and financial sectors (Herbold, 2010). In the frame of such an approach, there are a wide number of measures that governments, development agencies and other public stakeholders can put into action to ensure the sustainability and scalability of agri-insurance:

Provision of premium subsidies: especially in developing and emerging contexts, where the private insurance and reinsurance sectors might be quite unwilling to engage in agriculture (and where the contributory capacity of farmers is low), it is common for public actors to support the implementation and scaling up of micro-insurance programmes through

a subsidization policy. Subsidizing micro-insurance schemes allows premiums to be kept accessible and affordable for small-scale farmers, which allows considerable extension of a scheme's penetration, while managing systemic risk in diversified portfolios with reduced adverse selection (Hohl, 2018). It also enables farmers to move away – over time – from other more costly and less efficient forms of post-disaster support (such as direct ex post payments, see Section 3.5).

Having said that, it is fundamental for subsidies to be implemented through a **smart policy approach** that supports well-defined social objectives and does not critically impair the potential of the scheme to achieve sustainability over the long term. A poorly designed subsidy policy might encourage farmers to assume increasingly risky behaviors in their production processes (e.g. growing high-risk crops on unsuitable land), which is bound to increase their dependence on future subsidies as well. While a subsidy policy can be a perfectly valid policy tool to foster uptake and expansion of an agricultural insurance scheme, especially among the most vulnerable actors, it should be designed so that it accurately targets specific client segments and areas, minimizing leakage to others.

Furthermore, past experiences have shown that rather than subsidizing the premium rates directly, **contributing (at least in the earlier stages of the scheme) to the administrative and operational costs of the scheme**, as well as to other enabling elements²⁵ that can make the market more efficient, will ensure that the policy generates less market distortion. This can generate substantial cost reductions for the policy premiums (by reducing the overall costs and risk for the insurance providers), thereby making them more affordable for small-scale actors, while generating less distortions that could impede the engagement of private providers in the scheme in the long term²⁶ (Hess and Hazell, 2016; ILO, 2015a).

Furthermore, subsidization should not be seen by public stakeholders as a fundamental prerequisite to support for micro-insurance penetration. There are examples of countries, such as Argentina, which have managed to achieve high levels of coverage with unsubsidized named peril crop insurance and livestock insurance programmes throughout their history. A combination of public reinsurance support (see the end of this section) and investment in the public data-gathering infrastructure can be an effective alternative policy approach to subsidy provision (as a way to reduce costs and mitigate risk), especially in the early stage of an insurance scheme. A clear understanding – on the part of public decision-makers – of the **target farmer population's capacity to contribute to a scheme** is a fundamental prerequisite to implementing agri-insurance subsidization in a strategic manner (Mahul and Stutley, 2010; Hess and Hazell, 2016).

According to a survey conducted by the World Bank in over 65 countries, in 2010 subsidization was **the most common type of public sector intervention that sought to enable agricultural insurance**, with 63 percent of the surveyed countries supporting crop insurance in this manner, and 35 percent using it to support livestock coverage. On a global scale, 45 percent of the estimated total world amount of USD 25 billion in agricultural insurance premiums was subsidized by governments. Although subsidization rates are on average lower in LMICs than in richer countries, those emerging contexts where agri-insurance schemes have reached the largest scale, such as China and India, have been propelled by high government subsidies of at least 50 percent (ISF Advisors, 2018; Mahul and Stutley, 2010). In the specific case of India, illustrated in Box 3, these subsidy levels have been recently revised downwards due to concerns over sustainability and system abuse, which leaves open interesting questions regarding the optimal degree of public support for a scheme.

²⁵ These include, for example, the risk data collection process, infrastructural development and awareness campaigns about the mechanism underpinning the scheme.

²⁶ It is important to underline that these considerations refer to the implementation of micro-level insurance schemes, in which smallholders are actual owners of the insurance policy. It is a fact, nevertheless, that in many contexts farmers might be simply too poor and vulnerable to afford insurance. In these cases, the policyholder could opt for the implementation of a macro-level insurance arrangement, in which the region or state is the actual owner of the insurance policy, while smallholders are the beneficiaries of the payouts triggered following a disaster. The cases of FOGASA-SAC in Peru (Section 3.2) and CADENA in Mexico (Section 3.5) are good examples of this concept.

Box 3: Subsidy-related issues in the PMFBY scheme in India

The case of the *Pradhan Mantri Fasal Bima Yojana* (PMFBY) scheme in India is quite useful to illustrate how public subsidy arrangements can end up being heavily revised by governments due to the excessive burden placed on public budgets, as well as the risk of system abuse. The PMFBY is a public-private scheme, launched in 2016 and heavily revamped in 2020, which provides indemnity-based and area-yield coverage to farmers of specific crops against a wide range of natural hazards, including drought, flood, hail, hurricanes, forest fires, and pests and diseases. Private insurance companies compete to provide coverage according to a tender system, run by the government of each federated state, with contracts being assigned on a three-year basis based on the most competitive pricing for specific coverage levels (Hohl, 2018).

Although for many years the scheme was implemented mainly through compulsory bundling with agricultural credit availed by farmers from private FIs – the “Seasonal Agricultural Operational Loan” – since autumn of 2020 coverage has been made **completely voluntary**, following farmers’ extensive complaints of abuse of the system on the part of commercial banks and insurance providers (Prasad, 2020). For the year 2018-19, the PMFBY covered almost 5 million farmers and 51.9 million ha of farming land (30 percent of the country’s total), for a gross premium of INR 290 billion (USD 3.8 billion) (Times of India, 2020).

Up to 2020, premiums under the PMFBY were heavily subsidized in equal parts (50 percent) by the Union (Central) Government and each federated state, with the farmer paying only 1.5–5 percent of the sum insured, depending on the season and type of crop. **No caps were placed on such subsidies.** As a result, premiums for specific crops (such as sorghum and pearl millet) could reach up to 72 percent of the sum insured in some states (and often exceeding 30 percent), placing a heavy burden on the central government’s coffers. This had also led some states towards covering crops that were not really suitable for a specific district, such as rice in water-stressed areas (with premiums as high as 46 percent).

Consequently, as of 2020 the premium subsidy paid by the central government was capped at 30 percent for un-irrigated areas/crops, and 25 percent for irrigated ones. Premiums over 30 percent would either have to be borne by the individual state or by the insurance provider (which would, in fact, raise the premium for the farmers). The reasoning behind this move is that premiums above 30 percent are most likely due to factors such as weak or inconsistent data, unsuitable crops or lack of agricultural risk management practices. Although it appears that the move is meant to encourage individual states to implement measures to reduce excessive premiums, the risk is that the reform will end up **mainly impacting the farmers**, threatening their participation in the scheme and its sustainability over the longer term (Mishra, 2020).

Creation of an enabling regulatory environment:

specific reforms aimed at promoting and regulating agricultural risk management tools in general – and agricultural insurance in particular – are essential to overcome several of the most fundamental constraints detailed in the previous sections. To make a difference in this regard, a good practice for governments would be to introduce targeted policy

measures that seek to regulate the agri-insurance sector, as well as the institution of dedicated public agencies in this domain, the establishment of public-private partnerships in agriculture, the implementation of consumer protection measures for insurance clients, the use of mobile banking services and several other aspects.

Some of the case studies presented in Section 3 provide clear examples of the essential role that policy reform can have in unlocking agricultural insurance for small-scale actors. The Turkish public-private “Agricultural Insurance Pool” (TARSIM), for example, only came into existence following a 2005 governmental reform of partnerships in the agricultural sector. CADENA, the programme which allowed the extension of catastrophic risk insurance coverage to more than two million smallholders in Mexico, was the result of a 2003 governmental reform which set the stage for the development of a public-private market for agri-insurance (see Sections 3.4 and 3.5).

Data provision and infrastructure development:

the provision of accurate information is essential to enable all kinds of insurance models, whether the information provided consists of weather data, satellite imagery, statistical data on agricultural trends in specific areas, or data on regional economic performance and natural available natural resources. Given the public goods nature of this information, governments and other public stakeholders can play a major role in its collection, analysis and diffusion among all interested actors. This holds especially true for specific types of data that the private sector alone would not be interested in gathering, such as regular and accurate regional and national data on non-commercial smallholders’ yields.

Infrastructure development is, of course, a key enabler for data availability; for example, as mentioned in Section 2.4.3, implementing weather index insurance would require a dense network of weather stations at regional level, to ensure that basis risk is minimized. Apart from the data gathering infrastructure, governments can also invest in the creation of a **public data center** that consolidates, analyzes and makes available the collected information to all interested actors (public and private), on a timely basis. The government can either choose to manage this component directly, or to outsource it to a research center, consultancy or other private firm (Hess and Hazell, 2016).

Education, awareness and capacity building:

awareness-raising campaigns around the mechanisms that underpin existing agricultural insurance schemes, and especially on how to access them, are fundamental to ensuring that farmers are

able to benefit from such initiatives. Furthermore, these awareness-raising efforts can help to create a **culture of confidence** between the farmer and the insurer. More broadly, financial education directed at farmers regarding insurance as a risk management tool is important in order to create an insurance culture and foster demand on their side, as well as to address possible cognitive bias that might lead them to underestimate the likelihood of a natural event (see Section 2.3.4). Education and awareness campaigns should take into particular consideration the **gender dynamics present at community level**, as inadequate or improper engagement of women in a scheme’s design or delivery is a recipe for programme failure (see Box 5 at the end of this section).

In terms of **public capacity building**, the focus should be directed towards strengthening the expertise of the network of claims adjusters, agricultural extension officers and all other public agents who have a role in the insurance scheme, as this will be critical to ensuring the quality of a wide range of activities such as data gathering, claims assessment, payout handling, awareness raising among farmers and the monitoring of moral hazard. Although the capacity building focus should be directed towards public employees who have a direct hand in the operations and/or administration of the scheme, it is essential to ensure that all echelons of a public system (including Ministries, the Central Bank and apex representative bodies) have a modicum of awareness of the functioning and implications of an agri-insurance scheme, to ensure that public stakeholders’ incentives are properly aligned in the pursuit of the scheme’s objectives. Development agencies and NGOs can play a very significant role in terms of public capacity building, by providing or outsourcing agri-insurance experts capable of providing the required training to these actors, as well as developing training materials and operational guidelines to orient operations.

Provision of public reinsurance or other forms

of risk sharing: as already shown in Section 2.3.7, global reinsurance conglomerates usually eschew agricultural sectors in developing countries due to issues related to low market volumes, uncertain legal frameworks, and lack of transparent and objective data. Some governments have resorted to providing public reinsurance services to compensate for the

absence of these actors. Similar to the considerations regarding public subsidies detailed above, this kind of public assistance needs to be provided in a way that allows for a **gradual shift towards private reinsurance participation** as the agri-insurance market of a country grows, thus strengthening the long-term prospects for the market's sustainability.

Other forms of macro-level risk sharing that public stakeholders can enact include **multi-country risk pooling arrangements against natural disasters** and catastrophe bonds, which are high-yield debt instruments designed to raise money for insurance firms in the event of a devastating natural disaster. Although the analysis of these instruments goes beyond the scope of this publication,²⁷ it has to be underlined that there are excellent examples of these kinds of financing arrangements that act in synergy with national social protection strategies at the level of the individual countries. A clear example of this is the **Caribbean Catastrophe Risk Insurance Facility (CCRIF)**, a multi-country catastrophe fund created by 21 Caribbean and Central American governments in 2007 to mitigate the financial impact of hurricanes and earthquakes on their vulnerable populations, by providing rapid liquidity to public budgets in the aftermath of a disaster and ensure immediate support. Based on a combination

of index-based insurance products, CCRIF has since its inception provided 38 payouts to 13 of its member countries following hurricane strikes, for a total of USD 139 million, with all payments being handed out within 14 days of the event (CCRIF, 2019).

Research and development in insurance innovation: promoting public research on insurance modelling, product design, new assessment techniques and digital innovations, all tailored to different areas and specific underserved client segments, can result in extremely beneficial spillover effects on the whole agri-insurance market. This holds true especially for relatively “newer” innovations such as index-based models and mobile-enhanced products, for which substantial gaps in research or piloting might exist in the country. This kind of public support can act as a powerful trigger for private insurers who would not normally be willing or able to undertake the initial investment in research and development (R&D) required to successfully enter the agricultural market. Apart from the government, other public stakeholders such as foundations and development agencies can play a strong role in this field, for example by funding (or creating) research centers and think tanks devoted to agri-insurance modelling and innovation.



■ **Aftermath of a flood in rural Assam, India.**

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²⁷ Not least because these kinds of macro-level schemes usually lack a specific focus on the coverage of the agricultural sector.

Box 4: A few considerations regarding gender-related aspects of insurance provision

Gender-based disparities at the household level can strongly reduce the effectiveness and outreach of agricultural insurance as a social protection tool, especially when public entities do not take into proper consideration the gender-specific dynamics that define households and communities. Including gender-specific considerations in the design phase of a scheme is essential to ensure that insurance provision does not end up **shifting the balance and decision-making power** towards the head of the household, which – in developing and emerging contexts – is most often male. Consider, for example, the common case in which the provision of an insurance policy requires the ownership of a bank account or a land title as a prerequisite: any gender-based gap in those regards will also end up negatively affecting women's access to insurance. Another example: given that owning an insurance policy has been shown to enhance the creditworthiness of an individual, eventual imbalances in insurance coverage that favor men compared with women can also end up widening the gender gap in access to credit (Le Quesne *et al.*, 2017).

Note that gender-specific considerations should not only be reserved for the design phase of an insurance scheme: **delivery is also a fundamental issue**. Insurance schemes should account for delivery modalities for their products that employ gender-sensitive channels, specific to each context. A clear example would be reaching rural women – with the insurance product offer – directly in their places of work and living, to account for the fact that social and cultural dynamics might constrain their available time and mobility compared to men. Another example has to do with the **level of ease and comfort** that a female client might have with the agent charged with offering the product, which could be increased by employing a network of women-only agents. Furthermore, an eventual gender-based gap in financial literacy in a particular context should be kept in mind by the insurer (public or private) to adapt the offer of its product (as well as its mechanism) to the current levels of capacity of this specific client segment, as well as to account for the provision of targeted financial education and training on the side (InsuResilience, 2018).

2.6. Reflections on public-private partnerships in developing agri-insurance

In the past two decades, multiple examples of highly successful agricultural insurance schemes based on public-private partnerships (PPPs) have shown the advantages of this kind of approach, especially in developing and emerging contexts. Today, most large-scale agricultural insurance programmes operate as PPPs, in which insurance risk transfer acts as an integral component of a governmental risk management strategy. Among the many advantages brought by PPP arrangements are the following:

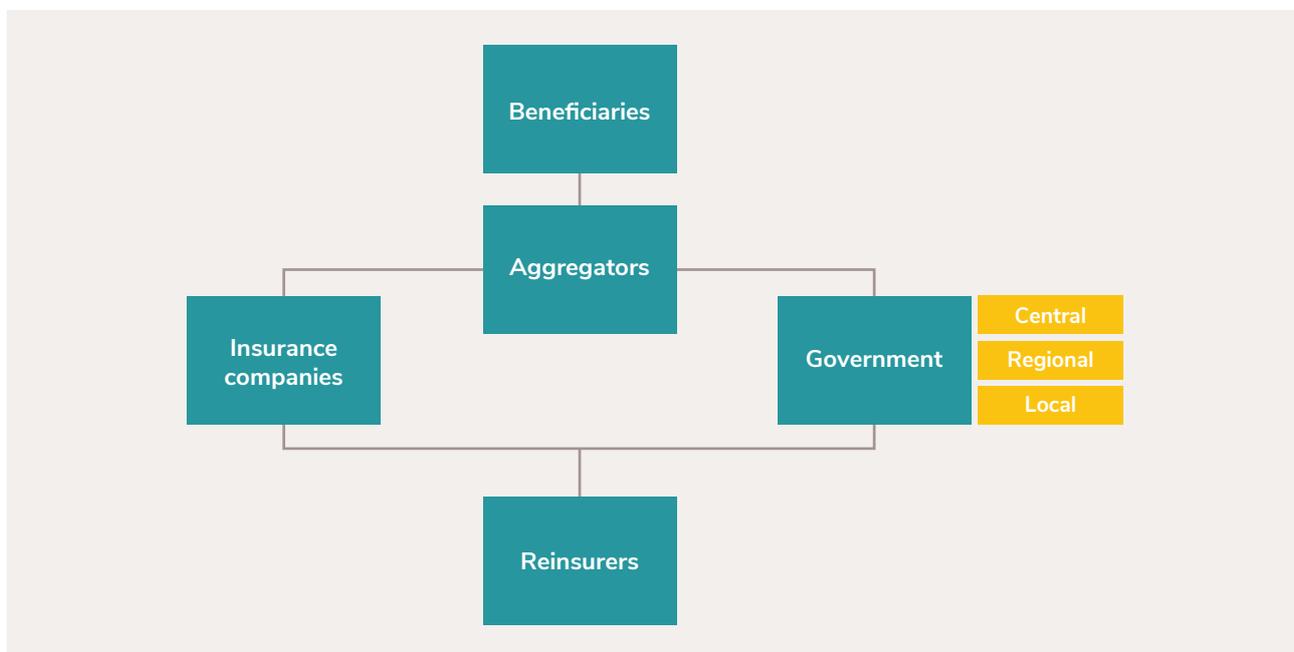
1. They allow the combination of the skills and expertise of both public and private partners in different manners. While public decision-makers can focus on policy, planning and regulation, private insurers can provide **substantial technical**

expertise in terms of agri-insurance underwriting, claim assessment, risk structuring and modelling, overall management and administration of the scheme, and a host of other aspects. As detailed above, this kind of specific expertise is often missing in the public sector, especially in developing contexts (ILO, 2015a);

2. They bring **market-based innovation and dynamism** to product and portfolio development, as well as a client-centered approach. They also assist in shifting **the private sector's R&D efforts** towards insurance modelling and product design focused on previously underserved segments of the rural population (i.e. smallholders and their households). Depending on how the PPP is set up, this also implies blending together public and private investment in R&D, with substantial derived benefits for both sides of the equation;

3. They allow the leveraging of an **established network of frontier agents** and distribution points – made available by the private insurers – that a public-private scheme can use to expand and scale up effectively;
4. They allow private insurers to collaborate with the government in developing an enhanced data gathering infrastructure, thus benefiting from **improved data collection practices** that can give them substantial advantages in terms of pricing and beneficial competition (ILO, 2015a);
5. They allow the establishment of a privileged two-way communication channel between the private insurers and their policymaking counterpart, which can be used to highlight and discuss legal and regulatory issues that limit the effectiveness of the insurance scheme, paving the way towards the harmonious development of an **enabling environment for agricultural insurance** at national level;
6. They allow private insurers to enter public insurance coverage programmes that have already achieved **substantial economies of scale**, thus reducing the operational and premium costs associated with entering the agri-insurance market, while strongly increasing penetration (ILO, 2015a). The case of CADENA, presented in Section 3.5, is a good example of this process;
7. They allow, over time, the establishment of a solid **public-private market for agricultural insurance** at country level, which is the result of an increasing number of private insurers expanding into the agricultural sector after witnessing firsthand the results achieved by their competitors in the partnership (and realizing that insurance provision to low-income agricultural actors is, in fact, a profitable business model).

Figure 5: Stakeholders' participation in a basic PPP in agri-insurance



Source: ILO, 2015a.

All of these aspects lead to a higher penetration rate of public-private schemes; reduced adverse selection; better diversified portfolios; reasonable administration costs; and more sound and effective underwriting (Hohl, 2018).

Figure 5 presents a basic depiction of a standard PPP in the agri-insurance domain, with four key categories of actors underpinning the mechanism (government, insurers, reinsurers and aggregators). Nevertheless, in reality these kinds of arrangements can take a number of different forms depending on the different role played by the various counterparts. Hohl (2018) proposes the **following categorization** of public-private agricultural insurance models:

1. **Commercial competition** between private insurers – who are free to choose their modalities of engagement in the agri-sector – with low levels of regulation on the part of the public sector, as well as subsidization;
2. **Closed schemes** where only selected private insurers are allowed to provide subsidized agri-insurance according to terms strictly regulated by the private sector. This is the case of the *Seguro Agrícola Catastrófico* (SAC) scheme in Peru (see Section 3.2);
3. **Monopolistic co-insurance pools** in which all private insurers cede risks and premiums to the pool itself, which is then responsible for agri-insurance provision, product design, claims auditing and payout handling, as well as for arranging reinsurance. The public sector oversees, regulates and subsidizes the pool. The case of TARSIM in Turkey (Section 3.4) is a good example of such an arrangement;
4. **Monopolistic private insurers** or cooperatives that only underwrite subsidized schemes under the instruction of the government (e.g. the National Agricultural Cooperative Federation in South Korea).

As will be further illustrated in the review of case studies in Section 3, regardless of the exact conformation taken by the PPP, a series of key aspects must be taken into consideration in order to guarantee the success and sustainability of any public-private arrangement:

- » The different roles to be played by public and private actors have to be clearly defined beforehand, as well as the associated responsibilities: **coordination is key** for the success of a PPP. Following this, a solid regulatory and legal framework is essential to give certainty to both public and private actors regarding the roles, responsibilities and commitments pertaining to all sides (ILO, 2015a);
- » The objectives of the partnership should be clearly laid out in its design, in order to properly align both private and public incentives, **while keeping the flexibility necessary to adjust the scheme's structure and functioning on the go**, as flaws and constraints start to emerge during implementation;
- » The financing structure of PPP should be designed **with sustainability in mind** – the considerations regarding public subsidies expressed in the previous section are particularly relevant in this respect. The goal of a public subsidy policy in a PPP arrangement should be the correction of market failures, not the creation of new ones;
- » To the maximum extent possible, PPPs **should not stifle external competition**, crowding new private competitors out of the market. Instead, they should be designed in a way that boosts and encourages the private insurance sector's gradual and further engagement in agriculture, "paving the way" through public example.

Box 5: Key disadvantages associated with public-private arrangements in agricultural insurance provision

Having defined some of the potential benefits related to the adoption of a public-private arrangement for agricultural insurance provision, it is also fundamental to underline the disadvantages associated with these kind of mechanisms, which might instead – depending on the context and the policy objectives – make the scheme designer and policymaker be more inclined towards adopting a purely public modality of insurance provision. In this sense, the following disadvantages can be cited:

- » **Potentially higher costs for the government:** every public-private partnership carries risks for the private participants, who will reasonably expect to be compensated for accepting those risks. This can increase costs on the government's side;
- » **Unbalanced technical capacity:** if the technical expertise in the partnership lies heavily on the private side, the government can find itself at an inherent disadvantage. For example, if it mainly relies on private sector's capacity to design and run the scheme, it might be unable to accurately assess the proposed costs or gauge whether proposed changes to a scheme's mechanism are actually useful or viable;
- » **Loss of decision-making power for the policymaker:** the presence of private providers in the insurance scheme – and the continued need to keep them engaged to ensure that the scheme keeps running – can limit the policymaker's scope for decision-making and impair future interventions and reforms that would be undertaken to ensure that the policy objectives pursued by the scheme are actually met. This will, of course, be highly dependent on the nuances of the contract or regulation that establishes the scheme and defines the roles and responsibilities of the public and private stakeholders involved;
- » **Stifling of external competition:** when there are only a limited number of private insurance providers in the country with the capacity to participate in the scheme, the relatively small field of bidders might imply a reduced level of competition, and thus less cost-effective partnering.



@MichaelTewelde/FAO

■ Dealing with drought in Somali Region, Ethiopia

Section 3:

Selection of case studies

The following case studies are all interesting and relevant examples of agricultural insurance schemes – targeting small-scale farmers and other agricultural value chain actors – that seek to provide disaster risk protection under the frame of a social protection strategy. These case studies were selected according to the proposed definition of a “social” application of agricultural insurance, as detailed in Sections 1.2 and 1.3. It is also important to underline that the final selection was influenced by the wish to showcase the great variety of schemes that could be argued to fall under this definition, from large-scale coverage schemes blending together catastrophic insurance and direct cash transfers (such as CADENA), to index-based and mobile-enhanced livestock coverage for small herders (such as KLIP), to co-insurance pools providing subsidized agricultural insurance to farmers (such as TARSIM).

3.1. KLIP in Kenya

The Kenya Livestock Insurance Programme (KLIP) is one of the first macro-level governmental insurance schemes in Africa that aims to provide **coverage against drought-related risks to small-scale herders**. This is particularly important in a context such as that in the Horn of Africa, where 72 percent of livestock death is caused by severe drought.²⁸ KLIP was first introduced in Kenya in October 2015, as a public-private partnership that saw the participation of the World Bank, the International Livestock Research Institute (ILRI) and the global reinsurance conglomerate Swiss Re. It was first piloted in two counties of northern Kenya and scaled up to cover a total of eight arid and semi-arid land (ASAL) counties as of 2019 (InsuResilience Investment Fund, 2018; Kyuma, 2019).

KLIP is a very interesting example of a large-scale, index-based NDVI²⁹ insurance scheme that uses satellite technology to safeguard the livelihoods of small-scale herders against drought risk. Satellite imagery is used to assess the state of the grazing conditions in a certain region, measuring the level of greenness of the pasture over an area and the implied foraging conditions for livestock units. Lump-sum payments for herders are triggered in the instance that the measured NDVI index in a specific area crosses a certain threshold. The system uses the **M-PESA mobile payment system for payouts**, allowing herders to receive timely insurance payments through their phones, which they can use to purchase feed, water or veterinary services needed by their animals to survive the drought period (see Box 6 on the following page for a series of considerations regarding the use of mobile technology in insurance). Furthermore, it was found by subsequent evaluations that beneficiaries also use the payouts to cover needs not related to their business, such as household expenses or **to support the broader community** (e.g. funding a communal well). All of these indirect uses can be argued to have further beneficial impacts on the food security of these actors (KLIP, 2018).

The system works as an effective safety net for these actors, allowing them to preserve their way of life and means of survival when struck by severe drought. It is also a good example of how it is possible for governments to slowly shift from an *asset replacement* approach in disaster risk management (i.e. providing cash transfers to replace the units of livestock lost in case of drought) to an *asset protection* strategy (i.e. avoiding livestock loss in the first place).

²⁸ To give an idea of the damage caused by drought to the Kenyan economy, consider that between 2008 and 2011 drought losses amounted to a total of KES 968.6 billion (USD 9 billion), with a reduction of 2.8 percent of the national GDP each year (Kyuma, 2019).

²⁹ Please refer to Section 2.4.5 for more information on index-based models built on the Normalized Difference Vegetation Index (NDVI).

Box 6: Focus on mobile insurance

The experience of KLIP is but one example of the vast potential that mobile technology holds for agricultural insurance. The provision of insurance services through mobile phones (whether basic cellphones or smartphones) has long since proven to be one of the most game-changing lines of innovation in fintech. The following are some of the advantages of mobile technology in insurance provision:

- » It allows the centralization and more effective management of the collection of data on clients' identities and activities, while substantially reducing administrative and operational costs;
- » It facilitates registration and significantly expands distribution channels, allowing providers to reach a large population of smallholders based in remote areas that are completely disconnected from brick-and-mortar banking and insurance services;
- » It significantly reduces the time required to apply for a policy, settle claims and communicate with clients. It allows for easier bundling of insurance with other financial services (such as a mobile wallet), as they can all be channeled into the same platform;
- » Most importantly, in the context of disaster risk management, the rapid provision of payouts following an extreme natural event, facilitated by mobile technology, represents a particularly critical advantage.

It is important to underline how issues relating to the enabling environment become particularly pressing when it comes to ensuring the uptake and sustainability of mobile insurance solutions, in terms of appropriate regulation (neither too stifling, nor too lax), adequate network coverage, sufficient mobile penetration and digital literacy, financial consumer protection, an efficient mobile agent network and many other elements.

The programme is completely subsidized by the Kenyan government. Up to five animals per herder's household are covered free of charge, while herders can choose to insure additional animals for a fee. The average payment is about KES 17 800³⁰ (around USD 170) per herder's household. As of 2019, KLIP had provided a total amount of KES 790 million in payouts (around USD 7.3 million). It is currently covering more than 18 000 households and 90 000 livestock units, for a total annual insured value of KES 4.5 billion (USD 42 million) (KLIP, 2018; Kyuma, 2019).

Recent challenges that have been identified as constraints on the future scalability of KLIP are: insufficient knowledge of the programme and of insurance in general (not just on the part of herders but also government officials); delays in payouts caused by logistical challenges such as inaccurate recording of people's names or network failures; and, in cases in which mobile payments were not an

option, excessive physical distance between insured herders and KLIP offices.

It is interesting to note that KLIP runs in parallel with another important social protection initiative of the Kenyan government aimed at small-scale herders residing in the same areas, a cash-transfer programme called the **Hunger Safety Net Programme** (HSNP). The HSNP programme provides herders' households with unconditional cash transfers of approximately USD 49 every two months, for two years, with the aim of assisting them in meeting immediate needs and making productive investments. It also provides for additional cash injections for recipient households in case of a disaster-induced crisis. To optimize subsidy provision, households benefitting from the HSNP cannot access KLIP at the same time (Janzen *et al.*, 2016). Both the HSNP and KLIP employ an emergency scale-up mechanism that is based on satellite data, with the two programmes **sharing data and methodology**.

³⁰ KES: Kenyan Shilling.

This helps them increase the accuracy of the vegetation index they employ, while lowering the administrative costs of implementation.

Overall, the joint experience of HSNP and KLIP provides a good example of how a livestock insurance and conditional cash transfer components can complement each other **within a broader social protection strategy**, in the frame of a layering approach to risk management – provided that both programmes are designed and tweaked in a way that appropriately channels resources and minimizes overlaps.

3.2. FOGASA-SAC in Peru

The *Seguro Agrícola Catastrófico* (SAC) is a public-private agricultural insurance scheme implemented in 2009 by the Government of Peru, which aims **to establish a safety net for small and vulnerable farmers** against the impact of extreme weather events. The scheme is overseen by the Ministry of Agriculture, with the government fully subsidizing SAC premiums through its “Guarantee Fund for Crop Insurance” (FOGASA). Two private insurance firms (*La Positiva Seguros* and MAPFRE) are responsible for providing subsidized coverage under the frame of SAC, as well as for loss assessment and claim auditing. A committee composed of representatives of the Ministries of Agriculture and Economics, as well as the private insurance companies, is responsible for ensuring coordination and discussion between the public and private sides of the programme.

SAC is a macro-level scheme: the beneficiary farmers are not the direct policyholders within the frame of the programme. Instead, each of Peru’s regional governments is responsible for **negotiating, contracting and implementing SAC’s policies**, as well as for dealing directly with the private insurance firms (in the same manner as the CADENA scheme in Mexico, illustrated in Section 3.5). At ground level, community leaders (together with functionaries of the state agricultural agencies) prepare lists of farmers

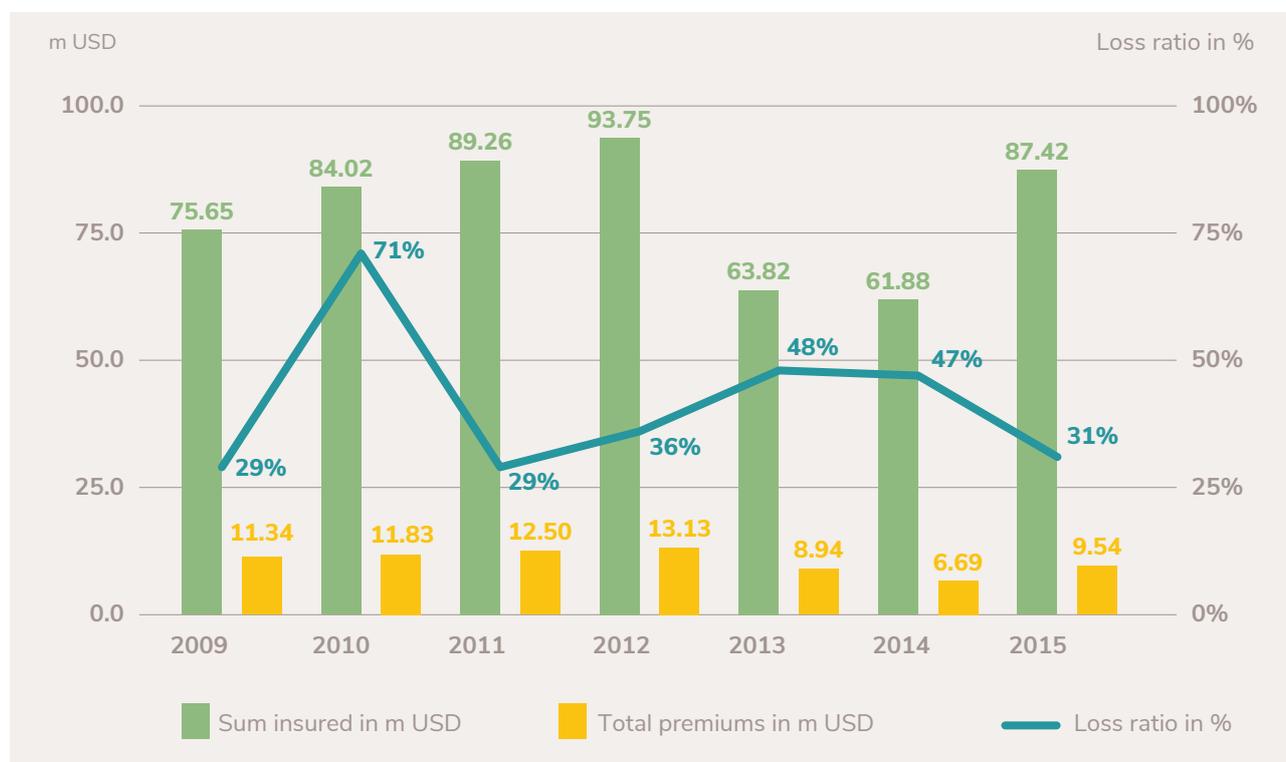
who have been impacted by natural disasters, with the two private insurance firms sending loss adjusters to determine the extent of the damage incurred to each farm. The insurance coverage provided by the scheme is based on an area-yield index: a payout is triggered in the event that the average return of the covered crops – as assessed by the field agents – falls below 40 percent of the recorded historical yield. In the instance that the claim is acknowledged, the payout is sent directly to the farmer’s savings account (ILO, 2015b).

SAC does not cover the production costs incurred by the farmer, nor does it indemnify the full loss experienced by a farmer following an extreme natural event. Instead it aims to provide **a basic level of compensation that allows a farmer to recuperate their labour costs** in the aftermath of a disaster and restart their business. In the agricultural year 2015/16, this compensation was set at approximately USD 160 per hectare affected (Hazell, Varangis and Sberro, 2017).

As of 2018, SAC covered eight of the poorest regions of Peru, where employment in small-scale agriculture is predominant. The programme covers approximately 425 000 ha and 56 000 beneficiaries, on average, per year. Risks that can be covered under the programme include drought, flood, avalanche, hail, forest fire, strong wind, high temperatures and pests. The programme has benefitted from substantial promotion and awareness campaigns carried out by the insurance firms, together with farmers’ education on the basic mechanism underpinning the scheme (especially the procedure for assessment of claims).

As can be seen from Figure 6, in the seven years following the program’s inception (2009–2015), the total sum insured by SAC has oscillated between USD 63 and 93 million, with total annual premium volumes between USD 6 and 13 million. The loss ratio of the program’s portfolio has been, on average, 41 percent, reaching 71 percent in 2010 (InsuResilience Investment Fund, 2018).

■ **Figure 6:** SAC performance (2009-2015)



Source: InsuResilience Investment Fund (2018).

The two private firms which participate in the SAC scheme have gained a number of benefits from their involvement: increased exposure to new regions where they did not operate before; better portfolio diversification; and an expanded offer of new insurance products developed within the frame of the scheme. Interestingly, *La Positiva Seguros* has recently begun to provide insurance payouts directly to farmers, via dedicated bank accounts (with the commercial bank *Banco de la Nación*) which were explicitly created to receive these payouts. As a result, more than 80 000 farmers have had a new formal savings account opened in their names.

Despite these results, SAC has also been characterized by a number of **design and implementation flaws** that have impaired its functioning, including the following:

- » The whole repayment process can be quite burdensome and lengthy for farmers, as it requires farmers to travel long distances to claim a payment in the aftermath of a natural event, which can lead to payout delays of up to 7 months;

- » No centralized and public data gathering system was set up to channel the large amount of information coming from the regions covered by the scheme, while no public share of the budget was set aside to aid in the data gathering efforts. This implied that the private insurance firms had to shoulder high costs to carry out data collection, **which was reflected in a higher cost of premiums;**
- » Political instability and changing governments have meant that the budget allocated to FOGASA by the Ministry of Agriculture can fluctuate considerably from year to year, as different administrations can have diverging opinions regarding the utility and importance of the SAC compared with other alternative interventions (such as direct post-disaster cash transfers to farmers). This also implies that there is always a certain degree of uncertainty and instability in the amount that will be allocated to FOGASA from one year to the next, which makes planning harder for the private insurers;

- » In line with the aforementioned issue of budget uncertainty, twice during the programme's existence the state has been late in approving the budget allocation for the subsidy to the SAC premiums. On both occasions the issue was corrected by granting retroactive coverage for the private insurers later in the agricultural year;
- » The definition of the risks covered and the target population under SAC has been marred by a lack of clarity and detail, which has led to inconsistencies in programme application from region to region (ILO, 2015b). Overall, the Ministry of Agriculture has not yet leveraged the massive trove of detailed data which the two private insurance firms have collected throughout the years concerning the loss events' impact on different crops and regions, which could aid in refining subsidies and payouts in a more granular manner.

3.3. PROAGRO, PROAGRO-Mais and PSR in Brazil

In past decades, the government of Brazil has developed a complex risk management strategy for the agricultural sector, with several components acting in tandem to strengthen farmers' resilience and preparedness against extreme natural events. The experience of the three governmental initiatives presented in this section is a good example of how different programme components related to disaster risk management for farmers can act in the frame of a broader social protection strategy, specifically through the provision of loan default protection (PROAGRO), default protection and agri-insurance (PROAGRO-Mais/SEAF) and insurance premium subsidies (PSR). This system has proved to be extremely important for a country such as Brazil, where, in recent years, the cumulative economic damage caused by a series of extreme natural events (in 2004, 2012 and 2014) generated a loss of USD 8.11 billion for the economy (Stutley *et al.*, 2017).

It should be noted, however, that a core flaw still present in this system is **the insufficient level of integration and alignment among these programmes**, which could eventually be achieved in the frame of a common approach towards agricultural insurance coverage in Brazil that does not yet exist. At present, the various programmes comprising the system target different categories of farmers and do not always align in their strategy. This issue is compounded by the fact that **the responsibility for the management of these programmes is still fragmented** among different federal institutions, including several ministries and the Central Bank of Brazil (BACEN).

The "Agricultural Activity Guarantee Programme", commonly known as **PROAGRO**, was first implemented by the Brazilian government in 1973 to **prevent credit default on the part of small and medium commercial farmers** and herders affected by extreme natural events (drought, frost, hail, excess rain, strong winds), as well as pests and diseases, which constrain their ability to repay their loans. It consists of the provision of a rural loan (for production or investment purposes) bundled with indemnity-based coverage, which allows a farmer affected by an extreme natural event to recoup his or her losses up to the limit of the credit upon which the premium had been charged. If the claim submitted by a farmer is approved, the minimum payment amounts to 70 percent of the loss, which can go up to 100 percent according to the individual beneficiary's claims record over the past 36 months (Stutley *et al.*, 2017). The payment is subsidized almost entirely by the federal government, together with a small contribution paid by the farmer that varies according to the farm's size, location and the amount of irrigation used.³¹ As of 2015, the maximum limit of indemnity for any farmer was set at BRL 300 000³² (around USD 94 000) (Bracale, 2016).

³¹ Note that PROAGRO is a purely public scheme, as the federal government provides coverage to the farmers. No private insurer is involved in the scheme, no formal insurance policy is stipulated with the farmer, and the Brazil's public entity devoted to overseeing private insurance arrangements, the Superintendence for Private Insurance (SUSEP), does not hold any jurisdiction over such matters.

³² BRL: Brazilian Real.

The programme provides coverage for 37 different kinds of crops against a wide variety of risks (excessive rain, hail, drought, strong winds, pests), with direct on-farm assessment of the damage incurred. PROAGRO is completely dependent on public resources, and is administered by the BACEN. The BACEN's field agents are charged with approving farmers' applications to PROAGRO (following a climate risk evaluation), collecting contributions from beneficiaries and verifying that incurred losses were due to causes covered by the programme. The terms required to benefit from PROAGRO coverage are quite rigid: cultivations have to be adequately managed and maintained by the farmer, who must prove they are employing appropriate farming technology, as well as preventive measures against climate variations and crop diseases (FAO, 2017b).

A recent innovation introduced to PROAGRO, which is notable for the purposes of this publication, is that permission has been given to bank agents to use drones to monitor whether the invested capital provided by PROAGRO is used in a proper manner by the farmer (see Box 7 for further considerations on the use of drone technology in emerging economies' agricultural sectors).

In 2005, the government also introduced **PROAGRO-Mais**,³³ a variant of PROAGRO that is specifically focused on protecting **family farmers**³⁴ who access agricultural financing through the public credit facility known as the "National Programme for the Strengthening of Family Agriculture" (PRONAF). Receiving a PRONAF loan entails automatic adherence to the PROAGRO-Mais programme from the farmer. By providing family farmers with coverage on their PRONAF loan – in case they become unable to pay back due to the consequences of an extreme event – PROAGRO-Mais not only allows them to avoid default, but also ensures that these actors are able to access PRONAF funding again to obtain credit for rehabilitation purposes. The maximum

Box 7: Focus on the use of drone technology in agricultural insurance

Although the large-scale use of unmanned aerial vehicles (UAVs) in emerging economies' agricultural sectors still lies far ahead in the future, it is becoming evident that the rapid evolution of this technology and the associated reductions in cost will allow for a more frequent deployment of drones in agriculture, for a wide range of tasks (e.g. spraying fertilizers, crop monitoring, farm security).

From the perspective of agricultural insurance provision, using drones to carry out on-field monitoring saves considerable time for the insurer and the adjuster, allowing them to access remote areas with considerable ease, making damage assessments and claims auditing more transparent and accurate. Drones can provide "below the clouds" imagery that is significantly more accurate than that provided by satellites, and which can be used to give an accurate assessment of the state of crops (e.g. soil condition, crop quality, presence of pests) over multiple smallholder plots with only one flight, providing visual and NDVI-based snapshots of the damage sustained over a specific area.

amount of protection granted by PROAGRO-Mais is set at BRL 35 000 (approximately USD 8 100), which can cover either 100 percent of the credit or up to 65 percent of the farmer's expected revenue derived from an agricultural activity (Stutley *et al.*, 2017). The programme seeks to promote and protect sustainable production systems that are closely associated with family farming, such as traditional crop cultivation, agroecological practices and organic farming.

³³ PROAGRO-Mais is also known as SEAF (*Seguro da Agricultura Familiar* or "Family Farming Insurance").

³⁴ More specifically, producers in agriculture, fisheries, aquaculture and forestry whose income over 12 months does not exceed BRL 360 000 (USD 86 600).

PROAGRO-Mais also includes a component that provides multi-risk insurance against extreme weather events to family farmers who take a loan from PRONAF, who are thus able to receive a further layer of coverage on top of PROAGRO-Mais' credit protection. This provides family farmers with coverage against excess rain, frost, hail, drought, pests and diseases, leveraging a network of weather stations managed by the National Institute of Meteorology (INMET). The insurance coverage covers 80–95 percent of the expected gross income, i.e. the estimated income in the farm based on its production. The premium can vary from 3 to 6.5 percent, depending on the type of crop covered, although 3 percent is applied in most cases. The programme is overseen by the Ministry of Agriculture, while the BACEN manages its finance and administration. As of 2019, PROAGRO-Mais and PROAGRO together covered 122 different types of crops, for a total of 64 954 contracts and a covered value of BRL 3.1 billion (USD 745 million).

In 2006, in an effort to foster the private insurance sector's engagement in agriculture, the Ministry of Agriculture introduced the **"Premium Subsidies Programme for Agricultural Insurance" (PSR)**, which aims to support commercial farmers through economic subsidies for the purchase of private agricultural insurance policies. The aim of the PSR is to encourage the private insurance sector's engagement in agriculture by shouldering part of the risk, thus reducing the cost of the premiums for farmers and increasing the extension of coverage across the country. The subsidies provided by PSR range from 35 to 55 percent of the premium, depending on the crop or other activity (forestry, livestock, floriculture, aquaculture) financed, as well as the priorities in agricultural policy formally set by the Ministry of Agriculture. The maximum amount of federal premium subsidy set for 2016–2018, in absolute terms, is USD 17 500 for crops and USD 5 700 for other activities. Approximately 70 types of crops are covered by the programme. Ten private insurance providers have so far been approved by the government to provide insurance policies subsidized by PSR; these firms shoulder all responsibilities related to product design and pricing, risk assumption, loss adjustment and claims payment. As of 2016, PSR was enabling 80 000 insurance policies.

As illustrated by Stutley *et al.* (2017), PSR has faced a series of important challenges in recent years, which have considerably limited its expansion in new regions and delayed it in achieving sustainability:

5. There is an issue of **overlaps in the target population** between PSR and other components of the system described in this section, caused by a lack of coordination between the various public institutions that manage the different interventions. The lack of information exchange between these components results almost invariably in a targeting overlap;
6. The Secretariat of Agricultural Policy, the technical division of the Ministry of Agriculture which manages the PSR, currently **lacks the technical capacity** required to carry out an accurate assessment on whether the private insurance coverage provided under the PSR is adequate and appropriate. More generally, the Ministry lacks the capacity to issue guidelines and norms that could regulate and direct the public-private insurance market that the PSR is creating;
7. Another issue brought forward by the private insurance companies that are part of PSR is the **unpredictability of the funding** that goes into the premium subsidy for agricultural insurance, coupled with the frequent changes that the Ministry of Agriculture has applied to the definition of the maximum liabilities and subsidy levels under the programme. Together, these have caused considerable operational disruptions to the private insurers' activities, forcing them to adjust their operational mechanisms and marketing strategies multiple times. For example, since 2009, the Ministry has repeatedly delayed payments to the private insurance providers, despite such funds being planned in advance. In 2015, the federal government froze subsidy provision to the PSR programme for a year, on account of not having enough resources to make payments. All of these disruptions have generated considerable uncertainty and confusion among the private insurance providers that are part of the PSR, limiting the effectiveness of the programme.

3.4. TARSIM in Turkey

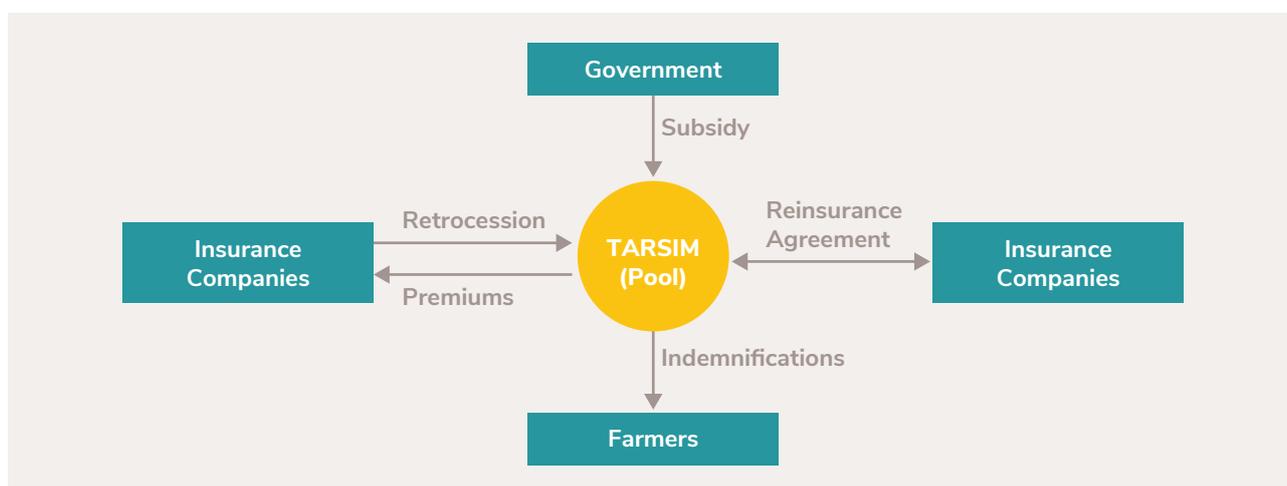
The “Agricultural Insurance Pool” (TARISM) was created in 2005 by the Turkish government and designed as a public-private scheme to provide standardized agri-insurance coverage to farmers. Its two core objectives are: 1) to provide insurance coverage for catastrophic risks that cannot be covered by a single insurance company; and 2) to encourage private sector participation in the agricultural insurance sector. As of today, 24 private insurance companies offer subsidized policies to farmers under the frame of TARSIM.

Prior to the formation of TARSIM in Turkey in 2005, **only 0.5 percent of the total agricultural area in Turkey was insured.** A number of private insurance companies provided limited crop and greenhouse insurance, mainly against hail, while livestock insurance was poorly developed. In general, the market for agricultural insurance was highly fragmented, operating on limited data that made it challenging to design and manage effective insurance products. Furthermore, the actuarial expertise and capacity in the country was quite limited (especially in the public sector), while public research in agricultural insurance modelling was scarcely funded. At the time, the Turkish government did not support agricultural insurance, but rather provided limited ex post and ad hoc disaster relief to crop and livestock producers, following a catastrophic loss event. The TARSIM public-private scheme was promoted to overcome these constraints and to establish the foundation for a modern national agri-insurance framework.

TARSIM is run by a **special purpose (joint-stock) company** whose shareholders are the 24 private companies which underwrite agricultural insurance within the frame of the scheme. The special purpose company reports to a management board that comprises representatives from the government and civil society (such as the Association of Insurance Companies of Turkey and the Union of Turkish Chambers of Agriculture).

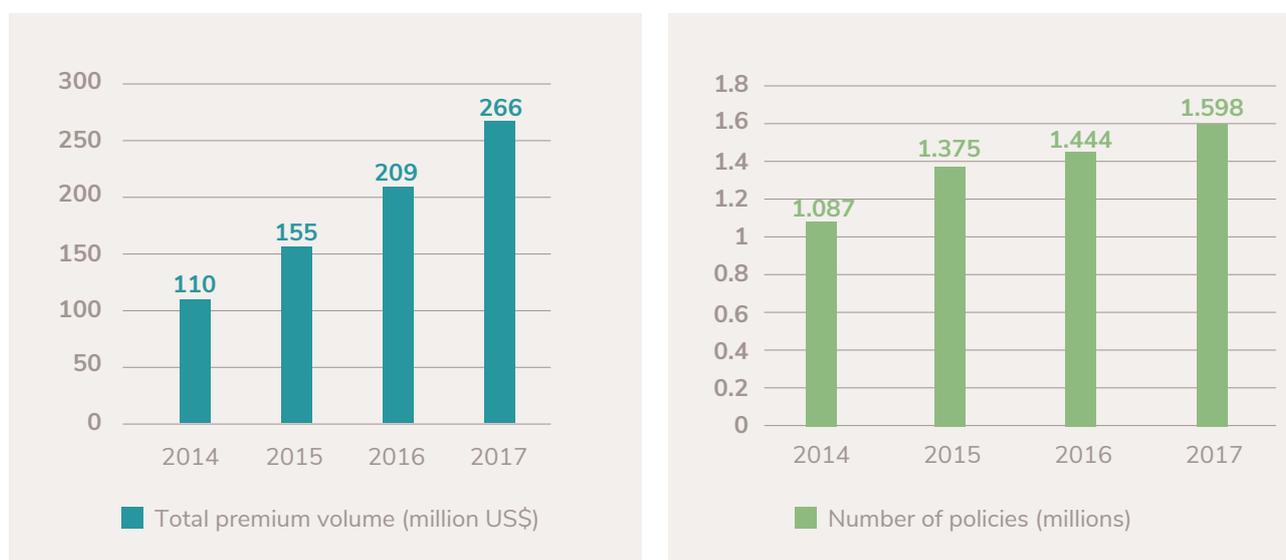
TARSIM functions as a **co-insurance pool**, with the 24 private insurance companies that participate in the pool approving and issuing agricultural insurance policies under their own names. All risks and premiums, however, are subsequently ceded to TARSIM, with the private insurers receiving a commission for bringing business to the pool. TARSIM is also authorized to transfer back specific risks to the insurance companies where there is mutual agreement (i.e. “retrocession”, see Figure 7). TARSIM itself, and not the individual insurers, is responsible for the design of the insurance products, as well as for centralized loss assessment, claim settlement, indemnifications and for arranging reinsurance. A wide number of insurance products are offered to farmers and herders under the frame of TARSIM, including named peril insurance (against hail and frost damage), yield insurance against drought, livestock insurance (for dairy cattle, sheep, goats and poultry), material damage coverage for greenhouses, aquaculture insurance and more. Tariffs can vary widely, depending on the region and policy type (Tekin et al., 2017).

■ **Figure 7:** TARSIM's core mechanism



Source: adapted from Bora, 2010.

■ **Figure 8:** Growth in TARSIM's total premium volume and total number of policies (2014-2017)



Source: TARSIM, 2017.

It is interesting to analyze the various measures that the Turkish government has implemented in order to enable TARSIM's expansion over the years, which connect to the overall discourse – introduced in Section 2.5 – regarding the public sector's role in fostering an enabling environment for agri-insurance at national level. These measures include:

- » Subsidizing the premium of all insurance policies stipulated under TARSIM by 50–66 percent;
- » Enacting a new policy in 2005 concerning public-private partnerships in agricultural insurance, which allowed the pool to be created and regulated;
- » Providing support to TARSIM for accessing reinsurance;
- » Providing an exemption from sales tax on all of TARSIM's insurance premiums.

Following the establishment of TARSIM, there has been a major expansion in demand for agricultural insurance from farmers in Turkey. In 2017, TARSIM provided almost 1.6 million policies to farmers,

with a total premium volume of USD 266 million and total loss reimbursements of USD 133 million (see Figure 8). Since its inception in 2005, the programme has grown to cover 14 percent of the total agricultural land of the country, with an average loss ratio of 68 percent between 2007 and 2015 (TARSIM, 2017; Hohl, 2018).

For the insurance companies that participate in it, TARSIM brings several advantages which are common to co-insurance pooling arrangements: reduced administrative and operational costs, derived from centralizing operations within a single entity; lower staffing requirements; joint investment in product research and development; a stronger negotiating power with international reinsurers, with subsequent reduced costs for reinsurance and improved risk diversification; and reduced costs for claim assessments and loss adjustment. On the negative side, having the major private insurers join together in a pooling mechanism at national level implies **a drastic reduction in market and price competition**, as well as lowering the available options in terms of product offer and type of crop coverage (Mahul and Stutley, 2010).

3.5. CADENA in Mexico

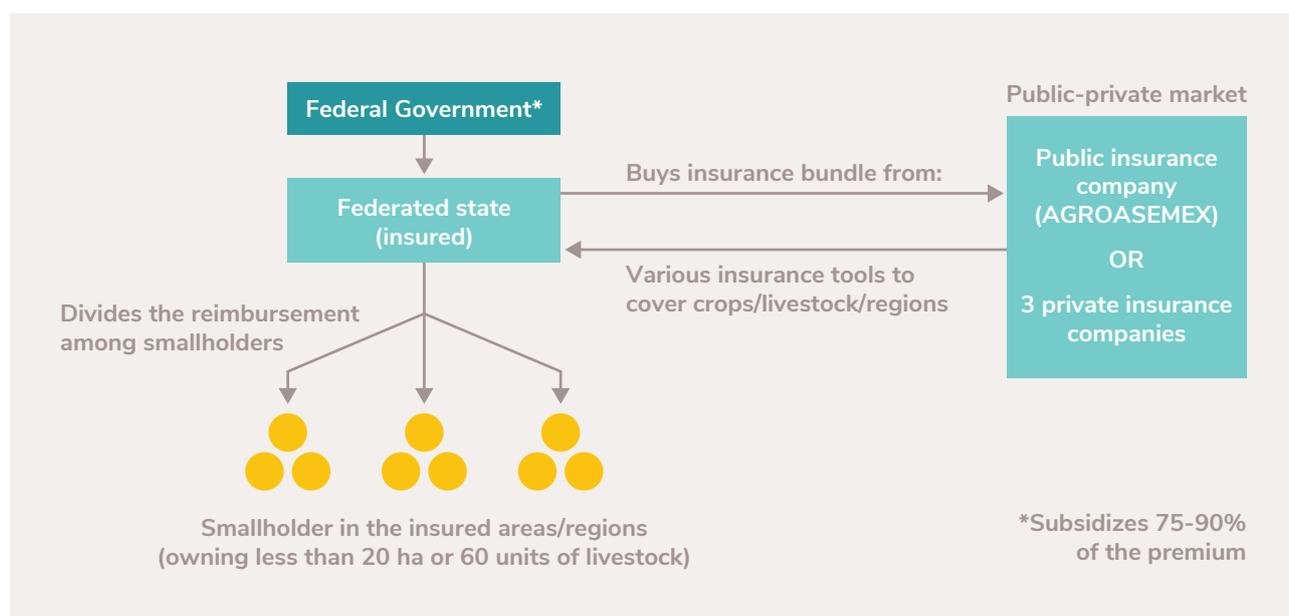
The “Component for the attention to natural disasters” (CADENA) is a public-private insurance coverage scheme launched in 2003 by the Mexican Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA). In launching this scheme, Mexico became one of the first countries to recognize the opportunities for the use of macro-level catastrophe climatic agricultural index products as a social safety net product for small subsistence farmers, for whom commercial crop insurance is not necessarily a suitable or cost-effective mechanism. The CADENA programme contains two core components: (i) the “Agricultural Insurance Against Catastrophes” (CADENA-SAC) programme for vulnerable farmers and herders; and (ii) in those areas where CADENA-SAC cannot be provided, a programme that provides direct support (CADENA-Apoyo Directo) compensation payments to farmers after extreme natural events. CADENA’s overall coverage extends to both extreme weather events (flood, drought, excess wind, hurricanes) as well as geological ones (earthquakes and volcano eruptions) (World Bank, 2013).

Within the frame of CADENA-SAC, insurance is provided by a public insurance company, *Agro-Aseguradora Mexicana* (AGROASEMEX), and three

competing private firms. The insurance model (illustrated in Figure 9) works as follows: each federated state of Mexico purchases a bundle of insurance products from the insurers, with which to cover different areas and municipalities under its jurisdiction against specific risks. This means that **the state itself is the owner of the policy**, while the farmers are only the ultimate beneficiaries of eventual payouts. These insurance products are a combination of index-based products (weather-based, NDVI and area-yield insurance) and indemnity-based livestock insurance. The federal government subsidizes the purchase of the insurance bundle on the part of the federated state by 75–90 percent of the premiums, with the highest subsidies reserved for the most vulnerable states and areas.

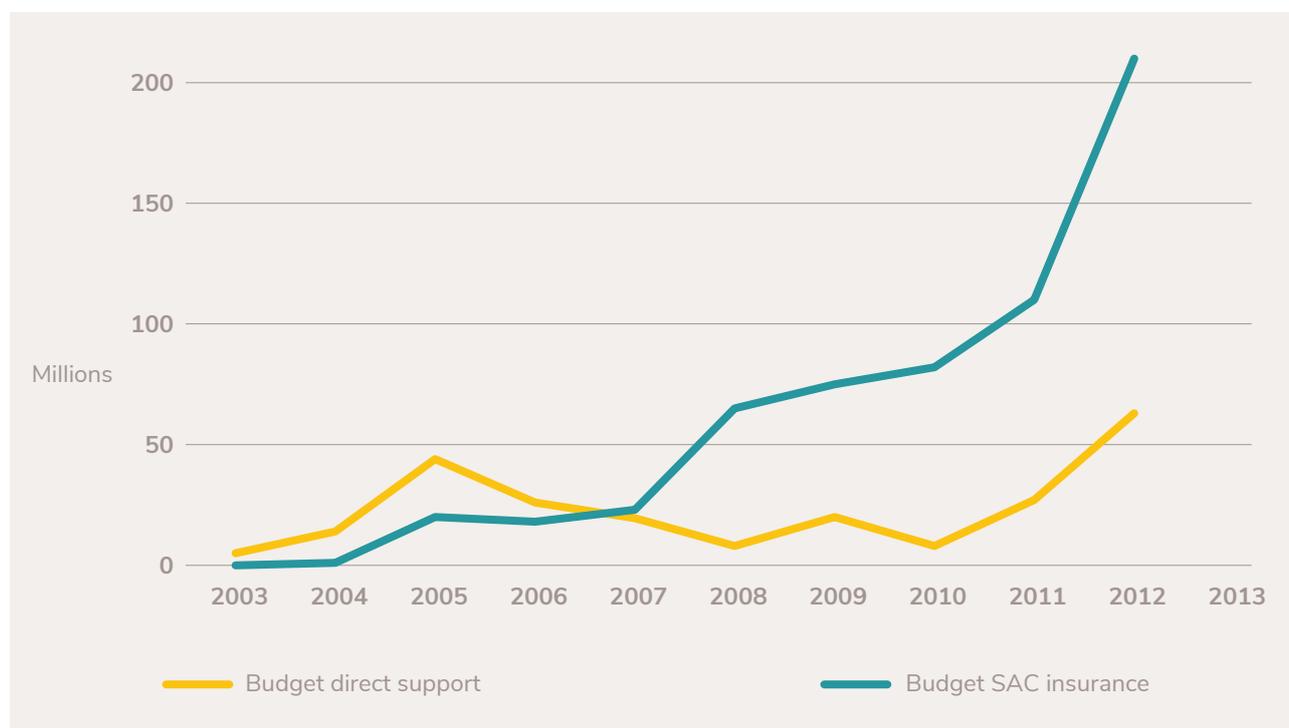
Once a disaster strikes, the state government is tasked with distributing the payouts received from the insurance companies to the farmers in the affected region. Only farmers who own less than 20 ha of land or 60 units of livestock are eligible to become beneficiaries of CADENA-SAC. This threshold was actually lower at the beginning of CADENA, but the government took the decision of raising it in 2011 after witnessing the positive results produced by the programme.

■ **Figure 9:** Insurance model of CADENA-SAC



Source: adapted from FAO, 2016.

■ **Figure 10:** Evolution of CADENA's federal budget



Source: ILO, 2015b.

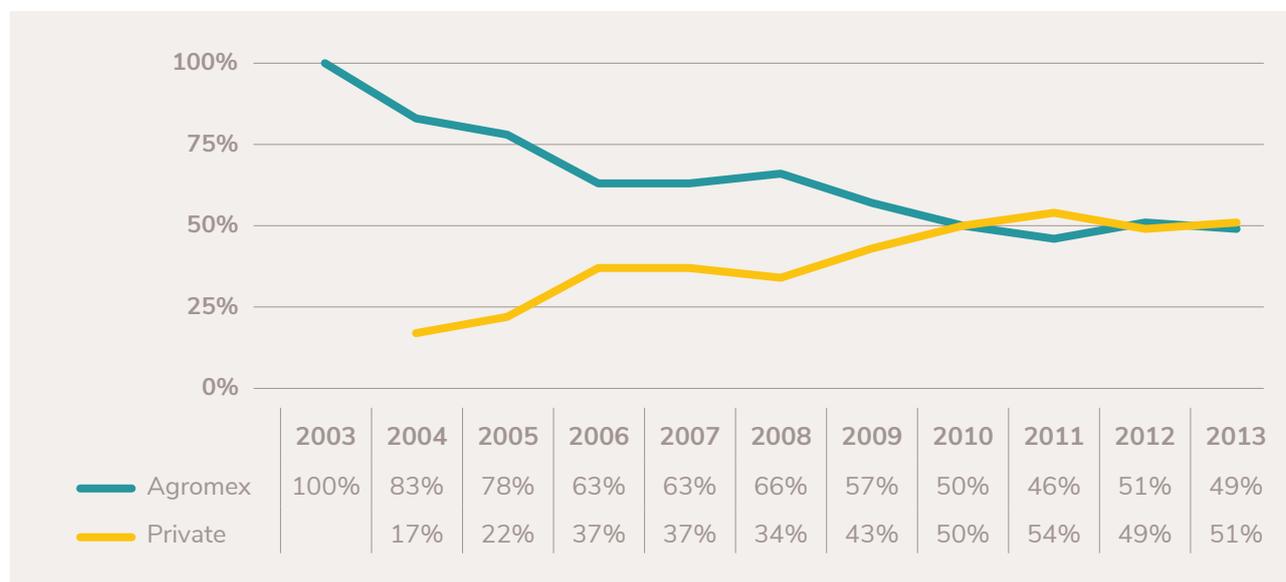
The compensation provided by CADENA in the aftermath of a natural disaster **is not proportional to the damage incurred by the farmer**. Instead, the programme provides an amount estimated as the minimum required for the farmer to be able to restart his or her business in the aftermath of an extreme natural event. This safety net does not force the farmer to use the money received strictly for their agricultural business: it can be used **in whatever way they see fit** for recuperation following an extreme natural event.

The second component of CADENA – focused on **direct post-disaster support** – is reserved for those areas where insurance provision to smallholders is unfeasible, for example when these are too remote, or if the specific crops cultivated cannot be insured. In this case, the government of the federated state provides direct payments to farmers in the aftermath of an event that both the state itself and the SAGARPA have declared to be “catastrophic”. In these instances, the federal government subsidizes 60 percent of the direct payments to smallholders. As can be seen in Figure 10, the direct support

component of CADENA has been slowly phased out over the years in favor of insurance, and it amounts nowadays to only 20 percent of CADENA's total budget. There are multiple reasons for this, chiefly the greater efficiency in budget planning that insurance provision allows (as premiums are fixed *ex ante*). Box 8 at the end of this section illustrates a series of aspects related to the potential advantages of insurance provision over post-disaster direct payments to farmers.

CADENA's growth has been quite noteworthy, not only due to its magnitude, but especially **for the rapid speed at which it has grown**. CADENA's budget has increased from USD 6 million in 2003 to USD 303 million in 2017, with the SAC-insurance component accounting for 80 percent of this sum. By 2017, CADENA's coverage extended to 12 million ha of cultivated land (65 percent of the country's total production area) over 32 federated states of Mexico, accounting for 98 percent of all municipalities in the country. This amounted to a total coverage of **3.7 million smallholders**, or 82 percent of Mexico's smallholder population.

Figure 11: Public-private participation in the market for agri-insurance against disasters (share of the total insured area)



Source: ILO, 2015b.

One of the most interesting achievements of CADENA has been driving the creation of a public-private market for agriculture in Mexico, a country where – prior to the inception of the programme – there was practically no private offer of insurance in this domain. This clearly shows the catalyzing role that the public sector can play in engaging private firms into the agri-insurance market, “paving the way” through public example. Figure 11 details the evolution of this market between 2003 and 2013. At the time of CADENA’s inception in 2003, only the public insurer, AGROASEMEX, provided coverage in the frame of the scheme. Three private insurance firms gradually joined the programme in the following years, until **a substantial balance was reached in 2013** in terms of the public and private shares of the total area covered by the programme.

Despite these extremely positive results, ensuring the future growth of CADENA will involve overcoming a series of challenges and design flaws that threaten its stability and growth. The two major ones are presented below:

- 1. Sustainability:** CADENA’s budget, as noted, has grown exponentially in recent years, and it is expected to grow further in the future. According to the forecasts, the federal budget of the SAC insurance component will have to increase by 25 percent in order to keep up with the scheme’s expansion over coming years. In this context, the federal government plans to shift even more of its resource allocation from the direct support component to the insurance one, given the considerable advantages in terms of economization and easier planning associated to the latter;
- 2. Competition issues:** The presence of a **non-profit public insurer** in the market (AGROASEMEX) has proven to be a destabilizing factor for competition, as private insurance companies struggle to match the offer this entity can provide. Furthermore, while AGROASEMEX is the only public research center for insurance modelling and structuring in the country, it does not disclose the results of its research to its competitors. Considering the public goods nature of such research, it is easy to see how this can act as a further constraining factor for the engagement of additional private insurance companies in the scheme (ILO, 2015a).

Box 8: The “Samaritan’s dilemma” in agricultural insurance

A relief measure that is considerably popular among governments in developing contexts is the provision of **ex post direct payments** to farmers struck by natural disasters, which is meant to act as a stopgap cash injection that allows for short-term support to the agricultural sector in the aftermath of a natural event. While these transfers are not meant to be proportionate to the actual damage incurred by the farmer, they usually take into consideration the size of the farm itself and can also include the distribution of in-kind commodities. Post-disaster transfers can be an extremely effective social protection measure to protect livelihoods in the aftermath of a disaster, allowing farmers to avoid resorting to negative coping strategies to cover their essential needs and **to purchase the essential livelihood assets or services** that they need to recover from the external shock.

Direct cash transfers and agricultural insurance provision can in fact coexist as complementary components within the same social protection system (as the CADENA case illustrates), although –when badly designed – the presence of a cash transfer intervention can actually impair insurance uptake. This is the so-called “Samaritan’s dilemma”, which stems from the fact that excessive leaning on post-disaster direct support on the part of public entities **can discourage farmers’ voluntary participation in public insurance programmes**, as those farmers who are on average less exposed to disaster risk will opt out of paying for insurance, preferring instead to rely on the protection provided by the post-disaster direct payments. This will lead to only high-risk farmers opting for insurance, increasing the insurer’s portfolio risk and affecting the performance of the overall scheme (Mahul and Stutley, 2010).

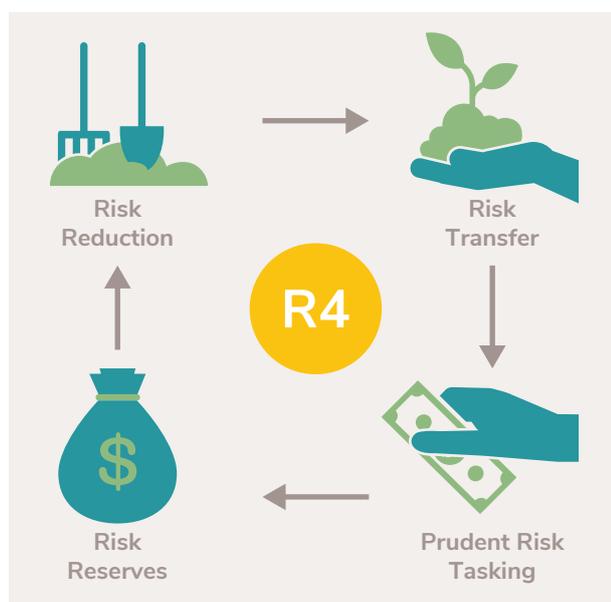
To conclude, the CADENA case study is extremely useful in illustrating how a government can establish, in a relatively short timeframe, a **large-scale and comprehensive social safety net** for millions of smallholder farmers, through subsidized public-private insurance provision at macro-level, which allows them to preserve their businesses even in the aftermath of extreme natural events. It shows how the engagement of the private insurance sector in small-scale agriculture can be encouraged and

promoted in a gradual manner, by paving the way through public example. It also demonstrates how a combination of indemnity- and index-based products can be offered to ensure comprehensive and tailored coverage for a variety of hazard-related risks, as well as different smallholders’ profiles. While CADENA is characterized by a very unique mix of design, implementation and contextual elements, the case does offer interesting insights that can be leveraged to replicate part of its results in other countries.

3.6. The Rural Resilience Initiative (R4) in Africa

The Rural Resilience Initiative (R4) was launched in 2011 as a joint collaboration between the World Food Programme (WFP) and Oxfam America, with the aim of enabling vulnerable smallholder households in Sub-Saharan Africa to increase their food and income security by managing climate-related risks. The initiative seeks to establish social safety nets for smallholders through a combination of different interventions, in the context of a holistic risk management approach that is based on four core areas, illustrated in Figure 12: insurance provision (risk transfer); improved resource management through asset creation (risk reduction); livelihoods diversification and microcredit (prudent risk-taking); and savings (risk reserves).

■ **Figure 12:** The four pillars of R4's system



Source: WFP and Oxfam, 2019.

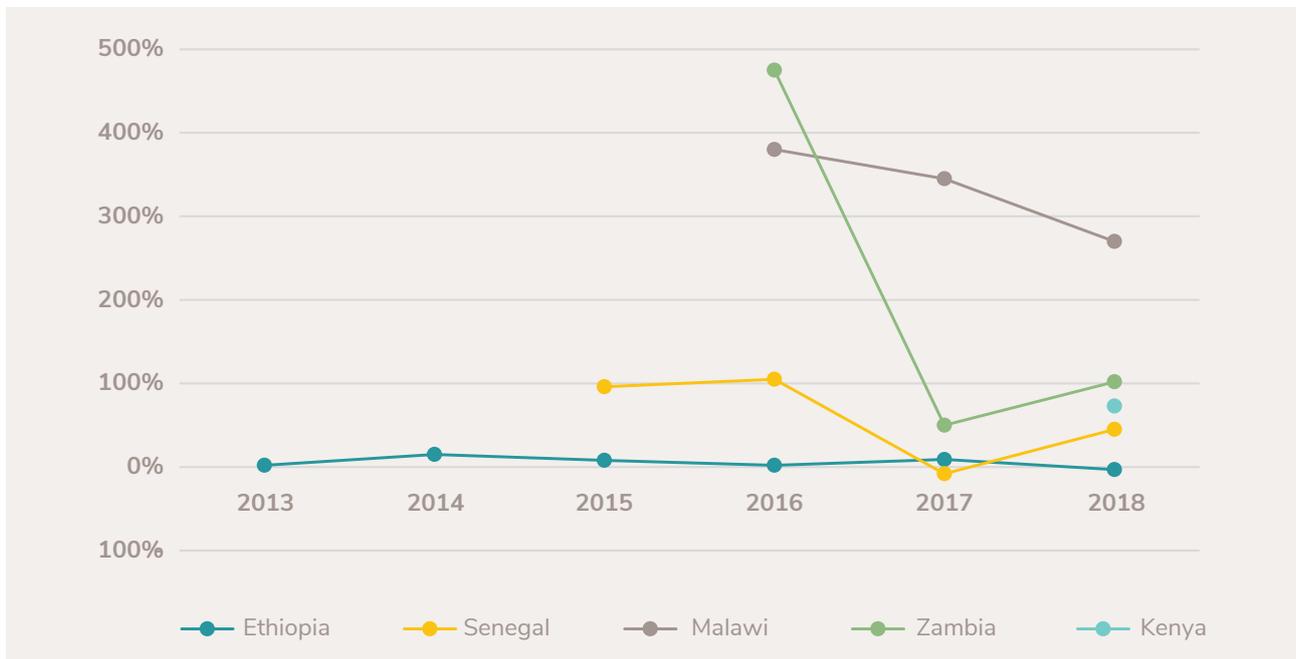
As of 2018, R4 was active in Ethiopia, Kenya, Malawi, Senegal, Zambia and Zimbabwe. It provided access to insurance and a range of complementary risk management options to approximately 87 000 farmers (of which 55 percent were women) and was estimated to indirectly benefit more than 450 000 people. The total sum insured as of 2018 amounted to approximately USD 10.3 million, while USD 2.4 million in payouts has been distributed to participating farmers since the program's inception. The objective of the R4 programme is to insure 500 000 farmers by 2022, with coverage expanded to 10–15 countries (WFP and Oxfam, 2019).

Under its **Risk Transfer component**, R4 provides weather-based index insurance to its target population of smallholder farmers, as well as area-yield insurance specifically in Kenya.³⁵ The payout received by the farmer after a disaster allows him or her to avoid having to sell productive assets in order to recuperate from the impact of a natural disaster, while stimulating a more rapid recovery. R4's insurance provision under this component **is usually built into existing safety nets** established by local governments or the WFP itself.

It is notable that the growth ratio of insurance coverage in the countries where the component is applied varies considerably from country to country (see Figure 13), in accordance with the planned expansion of the programme in certain countries (such as Malawi or Zambia), or specific resource constraints faced in others (as in Senegal). Furthermore, a core constraint that remains in the programme is the relatively slow pace at which insurance claims are settled (see Figure 14). Malawi is the only one among the five target countries for the R4 Risk Transfer component where the number of days required to settle a claim (48 days) is below the threshold set by the WFP as an acceptable limit (60 days).

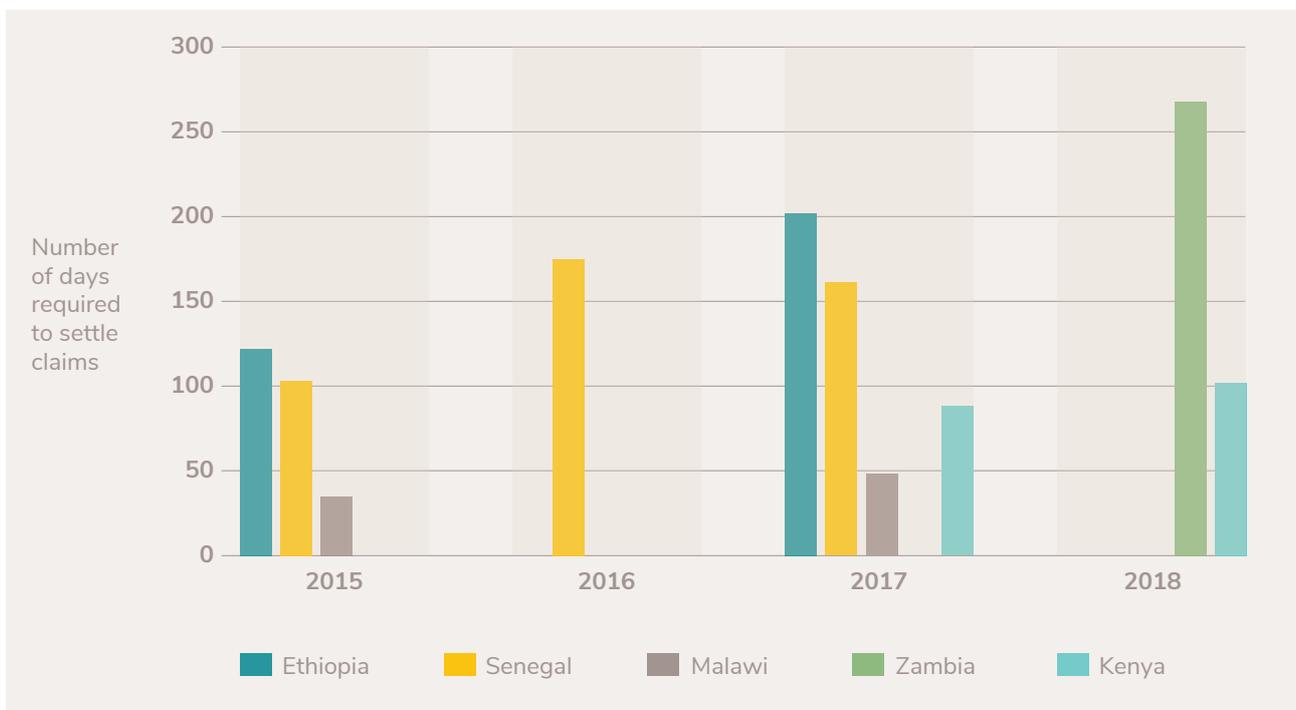
³⁵ Furthermore, in 2018 the R4 began offering NDVI satellite insurance to 5 000 small-scale herders in the Somali region of Ethiopia, through the Satellite Index Insurance for Pastoralist in Ethiopia (SIPE).

Figure 13: Growth ratio indicator in R4 countries



Source: WFP and Oxfam, 2019.

Figure 14: Promptness of claim settlement indicator in R4 countries



Source: WFP and Oxfam, 2019.

As part of R4's **Risk Reduction component**, farmers participate in a wide range of long-term risk reduction activities that can assist in reducing the impact of climate shocks on food production and livelihoods, such as land rehabilitation, compost pit making, constructing small dams, cultivating vegetable gardens and several more. Access to index insurance is conditional on farmers providing a set number of days for their participation in these asset-producing activities (or the application of conservation agricultural practices, in the case of Zambia), **as their contribution to the premium**. Furthermore, farmers also receive either food or food coupons as a result of their participation in these activities, through WFP's Food Assistance for Assets programme. This has proven to be quite effective in promoting the resilience of farmers and their families by steadily decreasing vulnerability to disaster risks over time (WFP and Oxfam, 2016). Finally, through a range of local partners in its countries of operations, R4 also provides education and awareness raising for vulnerable smallholder farmers regarding weather index insurance, financial literacy and disaster risk reduction practices. It also contributes towards strengthening the skills of local stakeholders (for instance, in agri-product design and management) and developing financial markets in the rural areas where it operates.

Under the initiative's last two components, **Risk Reserves and Prudent Risk-Taking**, R4 facilitates smallholders' access to village savings and loans arrangements, as well as local market structures, thus enabling them to: build a financial base to invest in their livelihoods; establish a buffer against disaster shocks; and invest in riskier and more remunerative

income-generating activities. Under Oxfam's Savings for Change programme (and other savings approaches), R4 members organize into savings and credit groups and cooperatives, enabling them to access credit from the groups themselves. The initiative is currently building linkages with access to market activities initiated by the WFP, in order to increase income generation and the expansion of insurance coverage.

An impact evaluation carried out in 2016 by Oxfam and WFP has shown that R4 has been quite effective in improving its target farmers' resilience. In Ethiopia, for example, insured farmers saved more than twice as much as those without any insurance, and they invested more in seeds, fertilizers and productive assets. The programme was also shown to have an impact from a gender equality standpoint. In Senegal, for example, women claimed that they felt more empowered, as, in addition to having increased access to land, seeds and water, they could also benefit from training in numeracy, literacy and business (WFP and Oxfam, 2016 and 2019).

Overall, the R4 initiative is a very good example of the application of an **adaptive social protection approach**, as it integrates different types of interventions that belong to the social protection, disaster risk management and climate change adaptation toolboxes, in an effort to strengthen the resilience and preparedness of smallholders and their households. It packages insurance provision with a range of complementary risk management measures such as increased access to credit and savings, inputs and extension advice, while making farmers' access to insurance conditional on their participation in *ex ante* risk reduction activities.

Section 4:

Open issues for further discussion

In the previous sections, this study has presented a theoretical framework to link agricultural insurance to social protection systems, while examining a number of relevant case studies that have managed to put this concept into action. The study argues that agricultural insurance – when operating in the frame of a social protection system – can significantly contribute towards strengthening the livelihoods of a target farmer population, while acting in tandem with a combination of other social protection interventions. As an emerging good practice, both the insurance and other social protection aspects should be taken into consideration by the policymaker when defining risk management strategies for rural and agricultural areas.

Despite this, it is essential to note that – notwithstanding the evidence and cases presented so far – integrating agricultural insurance within social protection systems remains a **nascent approach**. As set out in the previous sections, numerous points of contention still exist, from a methodological and practical perspective, in terms of: possible design and implementation choices and challenges; political and economic considerations; precise choice of targets; and a host of other elements.

This section seeks to summarize a **series of open questions** that illustrate the existing (and still unresolved) methodological and practical bottlenecks associated with using agricultural insurance as a risk management instrument within social protection systems. It is meant to act as a stepping stone towards defining – in the near future – a set of widely adopted guiding principles related to the implementation of these types of interventions, building on an ongoing conversation on this topic that is currently engaging a variety of different stakeholders.

Two main paths can be pursued in order to define this set of guiding principles: i) **establishing a body of practical evidence** (for example through pilots,

impact evaluations, surveys) on possible solutions to these bottlenecks, which could become an essential reference point for policymakers and development agencies to refine and expand the design possibilities of agricultural insurance interventions, within the frame of broader social protection systems; and ii) **encouraging expert consultations and stakeholder forums**, to exchange feedback and perspectives on the issues presented below, as well as identifying good practices for the establishment of agricultural insurance as a social protection instrument.

Key issues for discussion:

» What should the role of government be in the provision of agricultural insurance?

The government plays a central role in social protection systems. It sets the system's guiding principles, as well as the rules and regulations that frame its functioning and govern its programmes and operations. It plays a central role in connecting and coordinating fragmented schemes and interventions, thus ensuring the broad functioning of the system. It will also, in most cases, directly finance and, to different degrees, implement the system's administration, down to the delivery of the specific programmes that compose it.

Therefore, a significant level of involvement from the government to either mandate or manage schemes is an important determinant in linking agricultural insurance with social protection systems at country level. One central responsibility of a government in this context would be to ensure the availability and accessibility of the scheme for vulnerable farmers, so that a minimum level of protection for the same risk is available to all, independently of their contributory capacity. The modalities and degree to which a government ensures that

these conditions are met can vary depending on the context: further debate and evidence would be required to define these minimum levels and conditions with precision.

» **What is the best model for insurance provision in the frame of a social protection system?**

Section 2.6 of this study has presented evidence of some of the advantages associated with fostering a public-private model for agricultural insurance provision for small-scale actors – within the frame of social protection systems – in terms of increased sustainability, the leveraging of market-based innovation and dynamism, access to private sector capacity and several other factors.

Nevertheless, it is essential to note that the choice of how to finance and implement the insurance component of a social protection system ultimately depends entirely on a variety of considerations and factors that could bring policymakers to favour a **purely public modality of agricultural insurance provision**. These factors include: the specific policy goals meant to be achieved (which **might not include** the budgetary sustainability of the scheme); the political context in which the scheme is developed; the available and projected public resources to finance the intervention; the specific features of the agricultural sector in which the scheme operates (and how it is affected by climate change); the state of the insurance market (where private actors could be absent, uninterested or lacking in capacity); and the regulatory framework, among other aspects.

The case of Brazil, described in Section 3.3, is a good example of a purely public scheme encompassing a blend of different interventions (including direct insurance provision, credit default protection, premium subsidies) that has been extremely successful in achieving a variety of policy objectives related to farmers' livelihoods over recent decades, including enhanced climate risk protection, increased engagement of the private insurance sector in small-scale agriculture and the promotion of traditional crop cultivation and agroecological practices among family farmers.

The degree of public-private collaboration in a specific insurance scheme (if any) therefore ultimately represents a design decision for policymakers, influenced by policy objectives and contextual factors. In this sense, being able to refer to a **comprehensive body of evidence** – able to explain the intricacies of successful and failed examples of both public and public-private schemes – would allow policymakers to develop the best model of provision for their specific context, correct design flaws, and anticipate some of the major challenges associated with the choices they make in terms of design and implementation.

» **How can the beneficiary population be properly defined, targeted and segmented in accordance with the planned interventions?**

A core delivery challenge for social protection systems is accurately reaching different vulnerable segments of the population, ensuring that each of these segments benefits from the specific intervention (e.g. social cash transfers, social pensions, insurance) most suited to its needs and the risks it faces. In terms of combining agricultural insurance with other social protection interventions, this implies defining effective eligibility criteria to access the scheme, correctly identifying the segments of the smallholder population that would benefit the most from insurance coverage and establishing adequate controls for error, fraud and corruption (Ramm and Ankolekar, 2014). In this regard, as already mentioned in Section 1.1, the adoption of a **risk layering approach in design and implementation** can be of considerable assistance when developing a range of complementary interventions.

The case study of the Kenya Livestock Insurance Programme (KLIP) and the Hunger Safety Net Programme (HSNP), described in Section 3.1, provides a good example of a system that has achieved an accurate level of segmentation of the herder community, which is the target of its provision strategy. In the frame of this mechanism, the most vulnerable individuals are provided with unconditional cash transfers by the HSNP safety net, while those above a certain wealth threshold are covered by the KLIP livestock

insurance. This risk layering approach means that vulnerable people who are not eligible for social cash transfers (e. g. because their income is slightly higher than the eligibility threshold) can use the insurance payout triggered following a climate shock to avoid slipping back into poverty (InsuResilience, 2019).

Another point of debate, connected to targeting and balancing, relates to **the issue of subsidization**, i.e. to what degree should the state support farmers' access to agricultural insurance by contributing to the policy premium. As stated in Section 2.5, evidence strongly supports the idea that farmers covered by insurance should contribute financially at least in part to the premium, as an incentive towards risk awareness and to ensure they have enough "skin in the game" to adopt adequate risk management strategies in their production practices. The question which remains open revolves around what is considered the optimal degree of subsidization that should be selected by the scheme designer, i.e. the precise level of public support which is capable of enhancing farmers' uptake while leaving them with enough incentives for proper risk management.

Depending on the context, it should also be noted that sometimes the public-private provision of micro-insurance (i.e. with the farmer as direct policyholder), **even if heavily subsidized**, might not be a feasible solution for the poorest segment of the smallholder population, given their extreme resource constraints. As already illustrated in Section 1, an alternative solution would be to expand existing social assistance schemes through the establishment of a **macro-insurance scheme**, where the government acts as the policyholder at regional or state level and the smallholders are only the beneficiaries of the eventual triggered payouts. This is a principle of risk-informed and shock-responsive social protection, whereby existing social assistance programmes can be scaled up, either in terms of number of beneficiaries, and/or in terms of the type and size of benefit, in order to offset the impact of a shock.

The case of CADENA in Mexico, detailed in Section 3.5, is a good example of a very successful macro-level insurance scheme that has managed to provide a safety net for the poorest segment of smallholders, who are highly vulnerable to disaster risk. However, as with most macro-level schemes, CADENA cannot escape a critical bottleneck in the foreseeable future when it comes to ensuring its financial sustainability, as it is faced with a series of challenges such as worsening climate change, rising incidence of natural disasters and the lack of a deeper involvement from the private insurance sector (InsuResilience, 2019).

» **How can linkages with risk reduction activities be properly established?** Although insurance provision is capable of strengthening the resilience of a rural community against climate shocks, in order to properly foster climate adaptation in a sustainable manner it needs to be associated with complementary measures that **enhance risk reduction**. This becomes particularly important in those rural areas where natural disasters are both frequent and severe, such as those experiencing repeated cycles of flooding or drought, and in which risk reduction measures are necessary for insurance to become an affordable solution (by reducing premiums due to the lower risk profile of the beneficiaries). Hence, a social protection system that works in coherence with other sectors has a key role to play in providing small agricultural actors with the right incentives to implement risk reduction measures in their businesses and personal lives, as well invest in long-term adaptation to climate change.

The jury is still out on how to achieve this in a coherent manner, whether, for example, by providing comprehensive risk education to those farmers who participate in the insurance scheme, or by specifying participation in risk reduction activities as a strict prerequisite to being eligible for insurance provision. One interesting application of the latter concept is the R4 Initiative, described in Section 3.6, which makes farmers' access to index insurance conditional on their participation in a wide range

of long-term risk reduction activities that can help mitigate the impact of climate shocks on food production and livelihoods. Examples of such activities include land rehabilitation, compost pit making, constructing small dams and cultivating vegetable gardens, which the farmers perform as contribution to the insurance premium.

It must also be noted that **flaws in programme design** can achieve the exact opposite of risk reduction and resilience building. For example, if the intervention in question is a public fund providing post-disaster direct cash transfers to farmers, issues such as inaccurate targeting and political distortions can end up encouraging **underinvestment in risk reduction and preparedness** on the part of farmers (i.e. the “Samaritan’s dilemma” described in Section 3.5). Arguably, poorly designed social protection components could actually reduce incentives for agricultural actors to quickly adapt and change occupation or activity when confronted with the rising frequency of natural disasters in their area, caused by climate change (Jarzabkowski et al., 2019). This remains a point of contention, given that the available evidence concerning the potential negative impacts of agricultural insurance on social protection systems is still insufficient.

When it comes to flaws in the design and implementation of social protection components – originally supposed to foster risk reduction within the target population – it is evident that **limited public capacity** stands as the main culprit, together with political distortions and excessive administrative red tape. In several developing and emerging contexts, the lack of built-in government expertise in relation to disaster risk prevention and management can result in poor intervention choices, lack of advance planning and contingency measures, sub-optimal budgetary allocations, delays in post-disaster assistance and erroneous targeting, when confronted with the rising number and magnitude of extreme natural events. Poor institutional capacity also implies that public decision-makers are not able to fully grasp the complete range of risk management solutions (whether insurance, direct cash transfers, early warning systems or risk-reduction activities, among others) that are available to them to

pursue their policy objectives, as well as the many factors – structural and contextual – that are required to ensure the success and sustainability of such interventions (IFRC, 2019).

- » **How can it be ensured that the insurance scheme acts in synergy with the other programmes and sectors?** This point is closely connected to the previous issues presented in this section. Adequate coordination should be sought in order to ensure that different interventions targeting the same segments of the population act in a synergic manner – thus amplifying their respective impacts – instead of working against each other. As an example of the latter, an agricultural insurance scheme might pursue a considerably different objective than a livelihood diversification programme: whereas the first might seek to prevent farmers leaving their agricultural occupation in the aftermath of an extreme natural event, the other **might pursue exactly the opposite**. Another valid example (already illustrated at the end of Section 3.5) would be that of a post-disaster direct compensation programme for farmers which ends up **discouraging their voluntary participation** in an insurance scheme, as those farmers who are on average less exposed to disaster risk will prefer to avoid paying for insurance, relying instead on the protection provided by the post-disaster direct payments. This last point is also closely affected by the farmers’ knowledge of – and trust in – insurance as a financial product, which can considerably influence their inclination towards enrolling in an insurance scheme.

Hence, when it comes to designing a social protection system, it can be a challenge for policymakers to ensure that the various interventions they plan to implement (including insurance) do in fact pursue complementary objectives and **mutually reinforce each other**, or – at the very least – make it so that they act in parallel, without causing undue distortions to their respective operations. To ensure this, efficient planning and coordination tools and mechanisms need to be set in place within the system – and establishing a body of good practices and past successful experiences would be of great assistance in this sense.



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■ **Aftermath of the 2018 earthquake in Sulawesi, Indonesia.**

» **How can political considerations (and distortions) be addressed?** Beyond the theoretical methodology, it is a fact that the practical implementation of agricultural insurance in the frame of existing national social protection systems is likely to be subject to a variety of political influences and institutional complexities, which might distort or alter its functioning, target and objectives. Power struggles among different public agencies, the presence of partisan mentalities and inter-agency budgetary constraints can all contribute towards redirecting the resources and operations of an agricultural insurance scheme towards **unanticipated outcomes** (MCII, 2019).

Furthermore, as relates to the issue of accurate targeting, political considerations that lead to the favouring of specific target segments among agricultural actors ahead of others can generate vast gaps in assistance coverage, while exacerbating current inequalities. An insurance scheme against drought that only targets wealthier farmers, for example, would provide

these actors **with additional purchasing power** that allows them to buy any food or services that are available on the market in the aftermath of an extreme event. The resulting price increases in the market can actually reduce the capability of poorer, landless agricultural labourers – who do not have access to the coverage – to access these same products (Jarzabkowski *et al.*, 2019).

Several measures can be proposed to respond to issues related to political distortions, such as: promoting institutional capacity and awareness raising in the public sector; developing a solid regulatory framework and proper internal monitoring systems for insurance schemes; and carrying out impact evaluations that can accurately assess the actual results of a social protection interventions. In this sense, the public capacity building work carried out by international development agencies, such as FAO (see Box 9), can play a significant role in establishing an insurance culture at every echelon of a public system, while reducing distorting influences.

Box 9: Considerations on the role and positioning of FAO

As illustrated at the beginning of this study, adaptive social protection seeks to foster the resilience and preparedness of vulnerable households by implementing a blend of interventions that combine tools and instruments pertaining to social protection, disaster risk management and climate change adaptation. When it comes to implementing programmes that follow this approach, FAO has the evident advantage of being able to **leverage a wide range of expertise** that encompasses all these dimensions, through its Divisions and dedicated teams. This means that the organization would be able to easily mobilize the individual competences required to design each component of a programme that pursues an adaptive social protection approach, whether it relates to insurance, agricultural financial provision, social protection interventions or climate change and disaster risk management practices.

Furthermore, FAO has a long tradition of carrying out **public capacity building at country level**, directed at Ministries, Central Banks, development banks, apex bodies and other public actors at various echelons. Considering this, the organization can play a significant role in overcoming the public capacity gap relating to agricultural insurance at country level, by providing both training and resources that can assist in developing an insurance culture at all levels of a public system.

FAO's role is also critical in bringing **complementary services to farmers** that can make their uptake and use of insurance services more effective. The benefits of using insurance is determined by a person's capabilities, such as access to information, financial and business education, training in agricultural practices, and more. FAO has the technical expertise to provide these services, all of which can ultimately enable farmers to become more protected against risks.

Finally, shock-responsible social protection is an approach which is still nascent, and on the topic of which relatively little substantial literature or research has been developed so far, especially in terms of more quantitative and in-depth analyses that realistically evaluate the impact and cost-benefit considerations of programmes built on such premises. FAO can contribute towards **developing such a body of literature**, through case studies, impact evaluations and policy guides, which can prove to be an invaluable asset for policymakers and other public stakeholders seeking to replicate specific experiences in their own contexts.



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■ Fisherman on the White Nile, Karthoum, Sudan.

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Annex 1:

Brief glossary of insurance-related terms

The following section aims to provide a brief description of a number of insurance-related terms that have appeared throughout this study. Please refer to FAO (1992) for a more comprehensive glossary of terms related to insurance and rural finance.

Actuarial: describes the calculations made by an actuary. This is essentially a branch of statistics, dealing with the probabilities of an event occurring. Actuarial calculations, if they are to be at all accurate, require basic data over a sufficient time period to allow for the likelihood of future, risky events to be estimated with a reasonable degree of certainty.

Actuary: a person with a mathematical and statistical background who is responsible for the application of probability and statistical concepts to insurance aspects such as rating, premium, reserves and dividend calculations.

Adverse selection: the tendency of individuals with poorer-than-average risks to buy and maintain insurance. Adverse selection arises when insureds select only those coverages which are most likely to result in losses. In agricultural insurance, this can arise when high-risk farmers or farmers using less efficient practices participate, while other farmers, with more certain production expectations, do not, or when farmers apply for insurance only on their own high-risk crops or plots, withholding other units.

Arbitration: settlement of a dispute between parties involved in the insurance; usually between the insurer and the insured.

Basis risk: basis risk refers to the potential mismatch between index-triggered payouts and an insured individual's actual losses. It arises when an insured incurs a loss and does not receive an insurance payment sufficient to cover the loss (minus any

deductible) or when an insured experiences a loss and receives a payment that exceeds the amount of loss. As index-insurance indemnities are triggered by exogenous random variables, such as area-yields or weather events, an index-insurance policyholder can experience a yield or revenue loss and not receive an indemnity. The policyholder may also experience no yield or revenue loss and still receive an indemnity.

The effectiveness of index insurance as a risk management tool depends on how positively correlated farm yield losses are with the underlying index. In general, the more homogeneous the area, the lower the basis risk and the more effective area-yield insurance will be as a farm-level risk management tool. Similarly, the more closely a given weather index actually represents weather events on the farm, the more effective the index will be as a farm-level risk management tool (World Bank, 2005).

Claims adjuster/Loss adjuster: a claims specialist appointed by the insurance company to determine the amount of damage and loss covered by the insurance policy. They are required to investigate, negotiate and settle disputed claims, visiting the site of the loss in order to gather evidence and assess damage.

Financial capability: financial capability is defined as the combination of attitude, knowledge, skills and self-efficacy needed to make and exercise money management decisions that best fit the circumstances of one's life, within an enabling environment that includes – but is not limited to – access to appropriate financial services.

Insurance policy: a formal document including all clauses, riders, endorsements and papers attached thereto and made a part thereof which expresses the terms, exceptions and conditions of the contract of insurance between the insurer and insured. It is not the contract itself but evidence of the contract.

Insured peril: the cause of loss stated in the policy which on its occurrence entitles the insured to make a claim, e.g. hail, frost, wind, drought, excessive rain or pests and diseases.

Limit of liability: the maximum sum payable under an insurance/reinsurance policy for losses which have occurred. The limit of indemnity may be expressed per accident, per event, per occurrence or per annum.

No Claim Bonus: where an insured has made no claims in previous years of insurance, underwriters may decide to reduce the renewal premium. This premium reduction is termed the “No Claim Bonus” or “No Claim Discount”.

Parametric: parametric insurance or parametric risk transfer is a type of insurance, reinsurance or risk transfer arrangement that does not cover the pure loss incurred by an individual or entity, but instead agrees to issue a payment upon the occurrence of an objectively verifiable triggering event. In other words, it covers the probability of a predefined event happening, instead of indemnifying the actual loss incurred. Payouts are triggered by deviations above or below a set threshold measured on a specific index, such as rainfall, temperature or average crop yield over a specific area. One of the main flaws associated with parametric types of insurance is that they do not cover the actual event loss, but rather an approximation of the loss, which can result in a mismatch between the triggered payout and the damage effectively incurred by the policyholder (see basis risk, above).

Peril: a potential cause of loss or damage to the property. Perils can be insured or uninsured, with both being usually defined on the insurance policy. It is therefore important that loss adjustment procedures enable a distinction to be made between damage caused by insured and uninsured perils.

Premium: the amount of money that an individual or business pays for an insurance policy.

Reinsurance: when the total exposure of a risk or group of risks presents a hazard beyond the limit which is prudent for an insurance company to carry, the insurance company may purchase reinsurance

i.e. insurance of the insurance. Reinsurance has many advantages including: (i) levelling out the results of the insurance company over a period of time; (ii) limiting the exposure of individual risks and restricting losses paid out by the insurance company; (iii) potentially increasing an insurance company's solvency margin (percent of capital and reserves to net premium income), hence the company's financial strength; and (iv) that if the reinsurer participates in the profits of the insurance company, but also contributes to the losses, the net result could be a more stable loss ratio over the period of insurance.

Risk loading cost: risk loading costs are additional margins to the premium added by the insurance company when underwriting specific policies that present high risk profiles, such as agricultural insurance for smallholder farmers. An example of these additional costs is the uncertainty load, which is a margin to compensate the insurer for limited information or uncertainty associated with catastrophic insurance. For agricultural insurance policies that cover large, infrequent events in countries where the quality of data is poor, the uncertainty load can be a significant component of the premium (Mahul, 2012).

Risk pooling: one of the basic functions of a financial system in which the risk of providing financial services to one customer is pooled or intermingled with those of other customers with the objective of reducing the overall risk to the institutions offering the services.

Sum insured: the amount specified in the policy up to which the insurer will pay indemnities should the insured peril(s) occur and result in a loss to the insured property.

Total premium volume: the aggregate premium generated by policies written by insurance companies over a certain area/sector and over a specific period of time.

Underwriter: the same as an insurer or assurer. An individual or organization that accepts risks and states the terms under which it would be possible to insure the property.



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■ Protecting the coast in Talibura, East Nusa Tenggara, Indonesia.



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Linking agricultural insurance and social protection

The aim of this study is to provide readers with an overview of how agricultural insurance and social protection interventions can complement each other, within the frame of disaster risk management for vulnerable agricultural actors. Specifically, it aims to underline the operational nuances, challenges, opportunities and constraints associated with employing agricultural insurance within social protection systems. Furthermore, it presents a number of practical lessons learned and considerations that can be used by relevant public stakeholders (such as local policymakers and development agencies) to introduce aspects of agricultural insurance in programmes and initiatives that seek to strengthen social protection for vulnerable farmers.

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