Chapter 2: AGRICULTURAL INSURANCE: A BACKGROUND

In Chapter 1 we saw that insurance is one of the tools that farmers and other stakeholders can use to manage risks that are too large to manage on their own (risk layering). Part of that risk is transferred to another party, who takes it in return for a fee (or premium). Where available and affordable, agricultural insurance (crop or livestock) can provide great benefits to farm households:

1. Insurance can (and should) be used to complement other risk management approaches. Farmers can rely on informal household- and community-level strategies such as crop and labor diversification to manage small to moderate risks. In the event of a major weather shock, insurance can be designed to protect against revenue or consumption losses. This enables households to avoid selling livelihood assets or drawing on savings.
2. Insurance can assist farmers in accessing new opportunities by improving their ability to borrow either money or in-kind credits. In doing so, farm households may potentially experience safer and possibly higher returns.

Crop and livestock insurance are widely used in high-income countries. Markets are large, and there is a long experience in finding ways to insure agriculture with traditional insurance products. Given the focus of this paper on a particular type of crop insurance product for a specific set of risks, a wide discussion on agricultural insurance (including livestock insurance) will not be undertaken here.[4] In the following sections we will consider both traditional and nontraditional crop insurance products and review their differences.

2.1 AGRICULTURAL CROP INSURANCE PRODUCTS

Crop insurance products can broadly be classified into two major groups: indemnity-based insurance and index insurance.

4 For a detailed discussion of the development of agricultural insurance and the role of governments in it, see Mahul, O., and C.J. Stutley (2010). *Ibid.*

2.1.1 Indemnity-Based Crop Insurance

There are two main indemnity products:

- *Damage-based indemnity insurance* (or *named peril crop insurance*). Damage-based indemnity insurance is crop insurance in which the insurance claim is calculated by measuring the percentage damage in the field soon after the damage occurs. The damage measured in the field, less a deductible expressed as a percentage, is applied to the pre-agreed sum insured. The sum insured may be based on production costs or on the expected revenue. Where damage cannot be measured accurately immediately after the loss, the assessment may be deferred until later in the crop season. Damage-based indemnity insurance is best known for hail, but is also used for other named peril insurance products (such as frost and excessive rainfall).
- *Yield-based crop insurance* (or *Multiple Peril Crop Insurance, MPCI*). Yield-based crop insurance is coverage in which an insured yield (for example, tons/ha) is established as a percentage of the farmer's historical average yield. The insured yield is typically between 50 percent and 70 percent of the average yield on the farm. If the realized yield is less than the insured yield, an indemnity is paid equal to the difference between the actual yield and the insured yield, multiplied by a pre-agreed value. Yield-based crop insurance typically protects against multiple perils, meaning that it covers many different causes of yield loss (often because it is generally difficult to determine the exact cause of loss).

2.1.2 Index-Based Crop Insurance

Currently there are two types of index product:

- *Area yield index insurance*. Here the indemnity is based on the realized average yield of an area such as a county or district, not the actual yield of the insured party. The insured yield is established as a percentage of the average yield for the area. An indemnity is paid if the realized yield for the area is less than the insured yield regardless of the actual yield on a policyholder's

TABLE 2.1: Features of Crop Insurance Products

	PRODUCT	SUMMARY	PERILS	BENEFITS	CHALLENGES
TRADITIONAL PRODUCTS	Named peril crop insurance	• Specific perils • Damage-based policy • Measure % damage in field • Agreed sums insured • Operated in private sector • Generally unsubsidized • Experience in private sector	• Main: hail, fire • Other: frost, freeze, wind • Suited to localized, independently occurring, sudden perils • May include quality loss	• Simple policy • Limited farmer details needed at point of sale • Transparent loss assessment • Product experience • Manageable adverse selection and moral hazard (especially for hail)	• Individual farmer loss assessment • Loss assessment cost in small farmer systems • Not suited to complex perils, especially drought and pest
	Multiple Peril Crop Insurance (MPCI)	• All perils, few exclusions • Yield-based policy • Measure harvested yield • Compare to a % of average yield • High cost, often requires subsidy • Problematic for small farms • Concentrated in a few countries (USA, Canada, South Africa, Argentina) • Many failed attempts	• A wide list of perils • Difficult to exclude perils, as causes of loss cannot be identified • Includes management influences • May include quality loss • Occasionally includes some price risk	• More easily made into a "universal" product type • Limited technical adaptation required for different crops • Guarantees farmer production and income • Type of insurance farmers typically want and understand • Indemnifies each farmer according to yield	• Individual farmer loss assessment, major loss adjustment task, impartial loss adjustment difficult • Adverse selection (worst farmers benefit) • Moral hazard (exploitation of policy) • Major work to set up yield history for each farmer, poor data • High premium and administrative cost • Not suited where farms are small
INDEX-BASED PRODUCTS	Area yield index insurance	• Farmers grouped into assigned areas (e.g., district, county) • MPCI but on area average yield • All farmers in area treated equally • Effective where similar exposures affect whole districts • Largest program is NAIS (India)	• A wide list of perils • Difficult to exclude perils, as causes of loss cannot be identified • Includes management influences • May include quality loss • Occasionally includes some price risk	• No adverse selection, moral hazard, individual farmer loss adjustment • Low administrative costs • Can address catastrophe perils affecting group • Enrollment of farmers is easy • Captures all causes of yield loss	• Local perils (e.g., hail) will not result in payout • Yield history at local district level often not available or reliable • Basis risk at local level depending on district area and peril
	Weather Index Insurance (WII)	• Payouts based on weather station measurement • Index trigger, exit, increments set to expected loss of yield • Can be complex to design • Limited experience to date	• Main: rainfall deficit and excess; high, low, or prolonged temperatures • Other: high wind, sun • Combinations of above • Basis risk minimized for gradual events	• No adverse selection, moral hazard, individual farmer loss adjustment • Can address catastrophe perils affecting group • Transparent, objective Meteorological Service Data (MET) • Easier to reinsure	• Basis risk is key challenge • Setting up the index parameters is technically complex • Need good meteorological and agronomic data, crop modeling • Difficult to correlate damage for sudden-impact weather

Source: World Bank Agricultural Risk Management Training Materials.

farm. This type of index insurance requires historical area yield data.

- *Weather Index Insurance (WII)*. Here the indemnity is based on realizations of a specific weather parameter measured over a prespecified period of time at a particular weather station. The insurance can be structured to protect against index realizations that are either so high or so low that they are expected to cause crop losses. For example, the insurance can be structured to protect against either too much rainfall or too little. An indemnity is paid whenever the realized value of the index exceeds a prespecified threshold (for example, when protecting against too much rainfall) or when the index is less than the threshold (for example, when protecting against too little rainfall). The indemnity is calculated based on a pre-agreed sum insured per unit of the index.

Table 2.1 summarizes the main features, benefits, and challenges of these crop insurance products.

2.2 AGRICULTURAL INSURANCE IN DEVELOPING COUNTRIES

Access to agricultural insurance is generally very limited in developing countries. Quite simply, providing this type of insurance is challenging for insurers, resulting in costs that are normally prohibitive for farmers. Insurers have tended to concentrate on urban and industrial risks and therefore often do not have networks in rural areas. Where agricultural insurance can be provided, risks (weather, pest, disease, and so on) are often highly spatially correlated and therefore financially difficult for insurers to manage. In addition, there is arguably a hesitation among the international reinsurance market to become involved with local insurance companies to enable them to transfer offshore some of their own risk, although this has been less of a constraint in recent years.

Additionally, for farmers, insurance works best where and when other services are in place, such as access to credit, improved seeds and inputs, markets and functioning supply chains, and advisory services. Insurance often cannot add value to a farmer's livelihood unless her income can be enhanced through availability of other services. All too often, many of these services are absent in developing countries, so the usefulness or attractiveness of insurance is not present for farmers.

Although there is a relatively low penetration of agricultural insurance in developing countries, the experience gained over the past century or more of crop insurance development in a number of countries provides a number of lessons learned and pointers. Some of these are captured in box 2.1.

2.3 RISK LAYERING IN WEATHER-RELATED AGRICULTURAL INSURANCE

In the previous chapter we introduced the concept of risk layering. For risk transfer products, this is a vital part of the risk management task, as it helps to determine who carries which part and how much of a risk. This enables equitable risk sharing and also ensures that correct levels of cover are taken out by the right parties (especially based on ability to pay). Let us not forget, insurance is not a panacea that can cover 100 percent of risks at premium levels that will be attractive to agricultural sector stakeholders. Insurance has a role to play as part of the solution, not as the solution itself.

Figure 2.1 presents a simple risk-layering example in relation to excess rainfall and the application of risk transfer products.

2.3.1 Self-Retention Layer

Risk retention (by the farmer) is needed for manageable, smaller, frequent risks that have to be either mitigated by the farmer using standard farming practices or coped with by the farmer, household, or local community mechanisms. This self-help and community approach is the first layer for managing risks. Additionally, where inputs or credits are concerned, arrangements may be needed to agree to delayed repayment for inputs or rescheduling of interest or principal of loans. These arrangements are quite similar to insurance, in that the financing of negative impacts of risks are spread over time.

2.3.2 Market Risk Transfer Layer

Insurance is best suited to infrequent but severe events. At an aggregated level, layering risk means that the financial sector stakeholders may decide to retain or transfer risks depending on their financial capacity and appetite for risk. When insurers decide to transfer part of their risk to another party, they generally rely on reinsurance companies to achieve this. The existence of the reinsurance agreement effectively boosts the insurer's capital and enables them to underwrite more risk than their own capital would otherwise enable them to do. In addition to traditional insurance companies, other agriculture sector stakeholders do become involved in risk transfer operations. They can be financial institutions lending to agriculture, processors, or those dependent on agricultural production for their turnover.

BOX 2.1: Lessons Learned and Pointers for Crop Insurance in Developing Countries

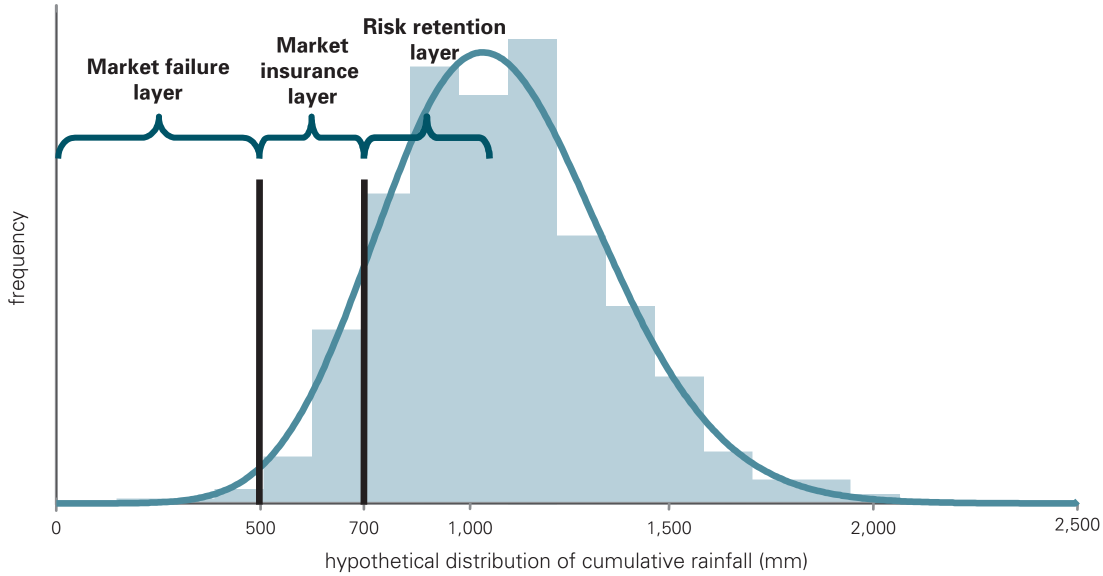
- Named peril crop insurance (mainly hail and fire) has operated as a financially sustainable, market-based insurance for more than a century, generally without subsidy or government intervention.
- MPCI has generally needed subsidies (except in South Africa). It does have the advantage of being a relatively standardized policy, irrespective of crop type. Governments have been attracted to yield-based crop insurance and the uniform nature of the product, but MPCI has some major issues in terms of loss adjustment, moral hazard, adverse selection, and high operational costs (hence the subsidies).
- Area yield index insurance is a relatively well established product, although not widespread. India has operated a (subsidized) area yield insurance, National Agricultural Insurance Scheme of India (NAIS), for 20 years.
- Weather index insurance is a relatively new development for agricultural applications. Many pilot projects have been started, but scaling up of weather index has happened only in a few countries (notably India).
- Index insurance is uncommon in high-income countries, which are dominated by markets with high uptake of named peril and MPCI insurance.
- The most common government intervention is through premium subsidy, often around 50 percent of premium but up to 80 percent in some countries. High levels of subsidy expenditure may not be sustainable in fiscally constrained economies or desirable, since subsidies tend to compromise commercial sustainability of agricultural insurance products by distorting risk-taking behavior and crowding out more efficient risk management mechanisms. Rent-seeking behavior can quickly add significant inefficiencies in delivery of agricultural insurance when subsidies are used.
- Other important government interventions are legal and regulatory frameworks and provision of public goods, such as data services and weather networks.
- The success or failure of crop insurance programs is related to the political economy of the country, the developmental status of agriculture, the complexity of the risks causing losses, and the management capability and leadership of the insurance organization.
- Transparency of products and of loss adjustment processes (leading to trust by farmers in the insurer and delivery or loss adjustment channels) is critical, irrespective of product type.
- Viability, integrity, and costs of loss adjustment procedures and operations are a critical test of the feasibility of agricultural insurance.
- The challenges of undertaking infield loss adjustment in small farmer agricultural systems for traditional indemnity products contribute to the attraction of index insurance.
- Grouping farmers in homogeneous risk areas, where they do not require individual loss adjustment, can make insurance feasible for small-farmer communities and reduce costs. However, this does increase the spatial correlation of the risk.

Source: Authors.

2.3.3 Market "Failure" Layer

Extreme losses from extremely rare, highly catastrophic events are not suitable for commercial insurance. For these types of losses governments or the broader international community may be needed to aggregate and transfer this risk layer out of the domestic economy to the international markets. This is also known as the "government intervention layer," as the fiscal responsibilities for reconstruction or such interventions as social safety nets lie with the affected government. Due to the risk that a government may decide to withdraw support for budgetary or political reasons, it is important to maintain a distinct segregation between the commercial layer described above and the social layer reserved for extremely rare and highly catastrophic events. This safeguards the commercial product from political whim, by allowing it to continue even if the market failure layer is no longer funded (as in Mongolia Index-Based Livestock Insurance [IBLI]).

FIGURE 2.1: Sample Rainfall Distribution Showing Layering of Deficit Rainfall Risk by Rainfall Levels



Source: Authors.

KEY POINTS

- There is no "one size fits all" insurance option. Index-based insurance is not the only alternative to traditional MPCI (in fact, it is not an alternative). In reality, there are different agricultural insurance products that are appropriate for different cases.
- Insuring against agricultural production risks is challenging. Many preconditions for successful implementation do not exist in developing countries. Index insurance, prima facie, offers a number of solutions that might overcome the lack of preconditions.
- Agricultural insurance often has social and policy objectives.
- Many governments give a high priority to development of agricultural insurance and can play an important role in insurance promotion through the provision of public goods (such as data and meteorological services) and legal and regulatory frameworks.
- Before deciding on promoting insurance for farmers as individual policyholders, a risk-layering exercise and consideration of the roles of the different stakeholders is imperative. It is important to define the role of the private and public sectors, taking into consideration the social and commercial objectives of insurance and the fact that they may be inconsistent.