



Innovations in Risk Insurance Models

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Introduction

Smallholder farmers face a range of risks related to production, transactions and human resources which often impact on their farming operations as well as their livelihoods. Farm output may vary from season to season because of the vagaries of the weather, especially in countries where agriculture is predominantly rain-fed. Crop production can also be affected by diseases, pests and other natural factors. They face human resource risks associated with death, disease and disability affecting the farmer and his/her family members. They may incur losses as a result of inability to enforce contracts and may themselves be vulnerable to legal risks arising from farm legislations or regulatory standards. Smallholder farmers are also exposed to uncertain access to markets and high price risks which may sometimes occur, or are accentuated by inefficiencies in markets or policy interventions. This brief provides an overview of different insurance tools that can be used by farmers to manage risks (see Table 1 for an overview of farm risks).

Table 1: Types of risks that generally apply to farming

Type of risk	Micro risk affecting a farm household	Meso risk affecting communities	Macro risk affection regions or nations
Market/prices		Changes in price of land, new requirements from food industry	Changes in input/output prices due to shocks, trade policy, new markets, endogenous variability
Production	Flooding, non-contagious diseases, loss or degradation of farm assets (land, livestock)	Rainfall, landslides, pollution	Floods, droughts, pests, contagious diseases, technology
Financial	Changes in income from other sources (non-farm)		Changes in interest rates/values of financial assets/access to credit
Institutional/legal	Liability of risk	Changes in local policy or regulations	Changes in regional or national policy
Personal	Personal hazards, e.g. sickness, disability, increased expenditures		





Smallholder farmers have limited access to formal risk management tools

The occurrence of a risk often generates a welfare loss to the farm household. This may be in the form of income or resource loss or reduced ability to earn income. The uncertainty about farm income resulting from exposure to farm risks tends to limit access to farm credit because of increased loan default risk. Lack of credit often translates into limited capacity of farmers to invest in yield-enhancing inputs, which will enable them raise output and productivity and therefore obtain higher household income. Furthermore, limited access to credit accentuates household liquidity constraints making them even more vulnerable to risk and compels most smallholder farmers to sell the bulk of their produce immediately after harvest when prices are extremely low.

Farmers in the industrialized countries are often able to use an array of instruments to isolate or cushion themselves against various shocks. They may benefit from public-funded programmes which seek to protect farmers from yield loss as well as variability in farmgate prices. They also have market-provided insurance products as well as cooperative insurance schemes which have proved to be quite successful in pooling risks. In Europe, Spain has a crop insurance scheme that is backed by government while France has a calamity fund to deal with disasters. The US has a range of private crop insurance schemes including the Multiple-Peril Crop Insurance (MPCI) which covers yield shortfall, and the Crop Revenue Coverage which protects against yield and price. They also have the Catastrophic Risk Protection (for which premiums are often subsidised by the Federal Government). Australia has no crop insurance but uses special flexibility in the banking system and the social security schemes to help farmers deal with shocks. In Canada, farmers' organisations have played important roles in developing supply management schemes and various income insurance programmes. In the specific case of flood risk the following compensation mechanisms are common in OECD countries: disaster relief, subsidised crop insurance, interest subsidies for loans, or compensation schemes for flood-water retention on farmland¹.

Farmers in developing countries are generally more vulnerable to farming risks than their counterparts in the industrialized countries largely because production is predominantly rain-fed and involves limited use of technologies to control the forces of nature. On top of that, they are severely disadvantaged in terms of access to formal risk management instruments. Most public support programmes are either unavailable, cannot be accessed by smallholders, or have been abolished or scaled down after liberalisation of agricultural sectors and market-based instruments which allow producers to transfer risk to better capitalised entities. Therefore, informal ways of reducing and coping with risk have been developed by farmers and rural communities over generations. The informal systems they adopt include the following:

- **Risk minimisation strategies** such as enterprise diversification (e.g. mixed cropping); share cropping (to share risk with landowner); cultivation of drought-tolerant but low-yielding varieties and re-allocation of labour between farm and non-farm rural employment.
- **Coping strategies** which include maintaining reserves of non-interest-earning assets which are sold in the event of a shock (e.g. livestock and jewellery); reducing household consumption and/or investment in, for example, education of children (especially girls).

These strategies often provide only limited protection to the farm household, hamper adoption of yield-enhancing technology and/or leave the household even more exposed to severe negative

¹ Morris, J., T. Hess and H. Posthumus. (2010) Agriculture's role in flood adaptation and mitigation – policy issues and approaches. Cranfield University. OECD. Available at: <http://dx.doi.org/10.1787/786804541573>



shocks². We discuss below some of the market-based risk management tools which can potentially be used to mitigate farm risks.

Conventional crop insurance mechanisms

Conventional crop insurance products are delivered by insurance companies, which take relatively small payments (*premiums*) from farmers (*the policy holders*) and guarantee that when a stated eventuality occurs they will compensate (*indemnity*) the insured for a financial loss incurred. The insurance policy usually sets out the terms, conditions and circumstances under which the insured will be financially compensated. The policies may cover single or multiple perils and compensation may be determined on the basis of yield or revenue loss depending on the type of insurance product. The insurance products can protect the livelihoods and assets of farmers from catastrophic losses. They can at the same time promote output and income growth at household level by improving access to farm credit and improved farm technology as risks are transferred to credible third parties (the insurance companies).

Most conventional insurance involves **reinsurance**. It is an insurance that is purchased by an insurance company (*insurer*) from another insurance company (*reinsurer*) as a means of transferring all or part of the risk to the *reinsurer*, who is paid a *reinsurance premium*. It is important for insurance companies that cover correlated risks and thus run the risk of having to cover big losses. Without reinsurance, premiums would have to be set at very high levels to build up enough reserves so that potentially high losses can be covered. In reinsurance schemes, the insurer and re-insurer can share premiums and risk by establishing a quota that determines how premiums and losses are distributed between direct insurer and reinsurer.

Innovative crop insurance mechanisms

In most developing countries, access to conventional crop insurance by smallholders is extremely low. A major supply-side factor is the fact that farm risks tend to be highly covariant (affect a large number of people at the same time, e.g. flood, drought and earthquakes) rather than idiosyncratic (affect individuals or a few people). Hence, pay-outs when the insured event occurs can be very high, which is why the insurance company has to charge very high premiums to sustain delivery. High levels of fraud and *moral hazard* problems (where the insured party is less diligent than normal because of the guarantee of payment if, for instance, in the event of a yield loss) are associated with this form of insurance. To mitigate this, insurance companies may be required to institute intensive monitoring systems, increasing the cost of delivery. Furthermore, demand tends to be rather high from those who are most at risk, also known as the *adverse selection* problem. On the demand-side, smallholders may find premiums unaffordable. They may also consider investing in an instrument from which there is no return in normal years unattractive, unless it is linked with improved access to credit and improved farm technology. Recent innovations in the insurance market have involved efforts to address some of these problems in order to ensure sustainable delivery of insurance to the poor, including smallholder farmers.

² Dercon, S. (2002). Growth and shocks: evidence from rural Ethiopia. *Journal of Development Economics* 74(2): 309-329

Siegel (2005). Looking at rural risk management using an asset-based approach. Commodity Risk Management Group, Agricultural and Rural Development Department, ESW, The World Bank, Washington, DC.



Index-based insurance

A different category of insurances are index based. These make payments based not on measures of farm yields or revenues, but rather on indexes, measured by government agencies or other third parties. When the index falls below (e.g. in the case of drought) or above (e.g. in the case of flood) a certain threshold, insured farmers automatically receive a payment, eliminating the need to estimate their potential yield losses. These cost reductions make it possible to offer insurance to smallholder farmers. Unlike most insurances that require risks to be unlinked or independent, index insurances work best for the individual farmer when risks are linked. There are different types:

- Area Yield Index insurance: payments are calculated from the decrease in the average yield in a certain area, which is some unit of geographical aggregation larger than the farm.
- Area Revenue Index insurance: payments are calculated from the decrease in the combination of (i) the average yields and (ii) prices in a certain area.
- Weather Index Insurance: indices of yields or vegetation computed from weather-based indices, satellite images and others. When, for instance, actual rainfall falls below this index, payments are made.

Index-based insurance products appear to have the best prospects for outreach to smallholder farmers on a sustainable basis. Indexation avoids some of the moral hazard and fraud problems that require very costly monitoring systems that make insurance unaffordable. There have even been schemes under which farmers who adopt farm husbandry practices that reduce losses when a trigger event occurs are rewarded. By broadening geographic coverage of the scheme, adverse selection problems can also be reduced. There have been, therefore, several (donor-funded) pilot projects but success cases remain limited. A number of recent reviews attribute this to factors such as the lack of (historical) data on the basis of which premiums can be computed accurately; lack of basic infrastructure (e.g. weather stations); contract design issues (e.g. it is argued that if the weather rather than the crop is insured then the product can be sold to other parties who are not farmers); limited uptake by banks and microfinance institutions which can link the insurance to credit, thereby making it more attractive to farmers; difficulty in attracting international reinsurance companies (some of which do not consider these as proper insurance products); and linkage to other insurance schemes (e.g. Calamity Funds), which cover losses when the scale of catastrophic events make private insurance uneconomic.

Calamity funds

When the scale of losses from calamities or natural catastrophes makes provision of market-based insurance difficult, governments often step in with aid. The relief for affected people may be provided from Calamity Funds which have the advantage of avoiding major distortion of government budgets. Well-known examples include the Philippines National Calamity Fund (NCF) and Local Calamity Fund (LCF). These funds are made available exclusively for disaster-related activities such as relief, rehabilitation, reconstruction, and other works or services in connection with calamities and can complement private insurance. It is possible for the private sector to contribute to the funds in the form of levies on output to insurance premiums.

Micro-insurance

The market for agricultural micro-insurance typically consists of low-income farmers in developing countries, with limited or no previous exposure to insurance. As is the case with conventional insurance, which involves pooling risks, micro-insurance does the same, but links multiple small units into larger structures that can pool risks and as such creates structures for governance. The novelty lies in the organized approach involving multiple levels. It may cover a wide variety of risks



including health risks (illness, injury, or death) and property risks (damage or loss). Some of the micro-insurance products offered include funeral insurance, life insurance and disability insurance. This mechanism may be less suitable for covariant risks such as risks related to extreme weather (e.g. flooding, drought) or other natural hazards.

Micro-cooperative approach

Similarly, one can imagine that a micro-price pooling approach can to a certain extent mitigate the negative effects of crop price variability for African farmers within even a small community. This might be labelled a micro-cooperative approach. Pooling spot prices among farmers in a situation where sales can be spread over a longer harvesting time, may reduce price risks to all members of the pool. The efficacy will increase if storage facilities are available.

Emerging conclusions

It is apparent that pervasive production and post-harvest risks constitute a major obstacle in efforts to increase productivity, raise household income and reduce poverty among smallholder farmers. Smallholder farmers tend to rely on informal risk minimisation and coping strategies that are sub-optimal because of lack of access to formal insurance instruments. Innovative insurance products with features that reduce moral hazard and adverse selection problems as well as fraud while also reducing monitoring and administrative costs have the potential to increase access to insurance for smallholders. Uptake of such products, which include index-based insurance products, has been slow but can potentially increase if they are linked with improved access to credit. Furthermore, the private market may not be sufficiently capitalised to bear the cost of major calamities and as such setting up well-funded Calamity Funds to complement private insurance will be worthwhile. It is also apparent, as illustrated in Table 2 below, that some of the risks facing smallholder farmers cannot be mitigated using insurance products, in particular risks related to markets and the institutional environment. They have to deploy other risk mitigating instruments beyond the scope of this brief.

Table 2: Mechanisms to mitigate risks faced by smallholder farmers

Type of risk	Micro risk affecting a farm household	Meso risk affecting communities	Macro risk affection regions or nations
Market/prices	Contract farming	Micro-cooperative approach Forward contracts OTC Put options and exchange-traded options	Forward contracts and exchange-traded options
Production	Index-based insurance Traditional crop insurance	Index-based insurance complemented by Calamity funds	Calamity funds complemented by Index-based insurance
Financial	Financial savings and access to consumption smoothing credit	Financial savings and access to consumption smoothing credit	Welfare support systems Financial savings and access to consumption smoothing credit
Institutional/legal	-	-	-
Personal	Micro-insurance	Micro-insurance	Micro-insurance

