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## Impact assessment risk management tools

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The Farm Risk Management for Africa Project (FARMAF) aims to improve food security and livelihoods of the rural poor in Africa by enhancing smallholder farmers' access to sustainable tools and instruments to manage farm risks.

[www.farmaf.org](http://www.farmaf.org)

The following partners collaborate in the project:

Agrinatura-EEIG

CPF

MVIWATA

ZNFU

EAFF

PROPAC

ROPFA

SACAU

PAFO

Implementing institutions of Agrinatura-EEIG:

CIRAD

NRI

WUR

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## 1 Introduction impact assessment

African farmers are mainly smallholder farmers which tend to be severely constrained in investing in productivity-enhancing technology. This, in turn, can be partly attributed to inherent risks smallholder farmers in Africa face. Farm risks are prevalent at every stage of the agricultural value chain – from production to post-harvest storage, processing and marketing. For example, smallholder farmers face production risks including weather related risks. At the post-harvest level, African farmers often encounter considerable challenges accessing markets. They have little or no means to mitigate these risks, which tends to limit their capacity to invest in improved farm technology systems and thus to increase productivity. Exposure to farm risks can be attributed to poor financial services, under-developed transport and storage infrastructure, missing or weak market-supporting institutions, disabling policies and poor public services delivery systems.

The overall goal of the FARMAF project is to improve food security and livelihoods of the rural poor in Africa. The project focuses on smallholder farmers in target African countries, namely Burkina Faso, Tanzania and Zambia. The specific objective is to enhance access to and promote the use of effective farm risk management tools. It is expected that this will reduce exposure of smallholder farmers to downward shocks, improve access to credit, increase the capacity to invest in yield-enhancing technology, as well as strengthen farmers' capacity to better manage the marketing of agricultural produce. The overall impact on farm output and household income and food security will be positive, reducing poverty in rural households.

In this policy paper we provide more insight into the impact assessment framework and address related policy issues. First, we elaborate on the current state of affairs of three risk management tools analysed within the FARMAF project, namely insurance in Zambia and Burkina Faso, warehouse receipt systems in Tanzania and Burkina Faso, and market information systems in all three countries. Subsequently, methodological approaches fostering lesson-sharing, challenges encountered and related policy issues are discussed.

## 2 Impact assessment of risk management tools by FARMAF

The aim of the FARMAF project is to develop an impact assessment framework to evaluate the contribution of selected risk-management tools in selected countries (i.e., crop insurance, warehouse receipts and market information systems). Note that collective action of smallholders is an overarching theme within the FARMAF project. This assessment requires the combination of baseline and endline data whereby measures of relevant indicators should be available at the start and the end of the project. Baseline data include *ex ante* exposure to and management of farm risk, as well as data on selected relevant indicators. Toward the end of the project, comparable data are collected and used for the final assessment. Importantly, to avoid confounding impact of the risk tools and general trends, it is imperative to collect both baseline and endline data in villages receiving the risk management tools (so-called treatment villages) and villages not selected to receive these tools (so-called control villages). Such an approach enables a difference-in-differences analysis, greatly improving the scope for unbiased attribution.

### 2.1 Insurance

Insurance is an *ex-ante* measure to cope with crop losses by smoothening farm income (i.e., eligible claims in adverse years when indemnities are incurred). An impact assessment plan is developed and implemented to evaluate the role of insurance in Burkina Faso and Zambia. Important indicators to evaluate the tool are among others rates of adoption, pay-outs, use of credit, input use, yields, and household incomes. The two countries both offer unique opportunities for testing the impact that both insurance and credit have on households. It is important to aim for a difference-in-difference approach which requires that households are monitored (in all villages: both the treatment and the control) before the implementation of the tool and after some years of implementation.

The insurance case in Zambia focuses on the Lima credit scheme. The objective of the Lima scheme is to provide smallholder farmers without collateral access to commercial agricultural credit services based on a group savings and loans. Perils covered by LIMA via the Agrisure policy include damage or destruction of crops caused by natural events such as drought, lightning, flood, hailstorm and fire. In case of calamities the insurance policy indemnifies the cost of inputs for which credit was obtained.

In addition to the provision of insurance and credit, the Lima scheme also provides fertilizer and seeds, a pre-harvest assessment, and grouping of farmers (with resulting peer monitoring). Hence, the intervention is multi-dimensional and any assessment of the current scheme captures the joint impact of these ingredients.

In 2014 a survey is conducted among smallholders in Zambia that are or can be included into the Lima Credit Scheme supported by ZNFU. The performance of this scheme and the role of insurance is currently evaluated.

The insurance case in Burkina Faso focuses on an index-based insurance scheme issued by PlaNet Guarantee. The scheme covers drought risks in maize. As in Zambia, insurance is linked with credit and a joint impact assessment is conducted.

Farm households were monitored in villages where the insurance will be offered as well as in other, control, villages. A baseline survey was conducted among 1564 smallholders in January 2013 in 14 villages in Mouhoun and 17 villages in Tuy in 2013. At that time PlaNet Guarantee was not yet present in these two provinces. An insurance awareness campaign under 465 smallholders was initiated (i.e., random encouragement design) of which 55 insured their crops. Moreover, 125 farmers were in the insurance control group (25 villages). In October 2015 (or October 2016) the farmers will be re-surveyed for a control trial impact assessment. The monitoring in the targeted zones in Burkina Faso also provides an opportunity to assess to a certain extent the basis risk that is inherent in this index-system.

## 2.2 Warehouse receipt systems

The potential benefits of the Warehouse receipt systems (WRS) include certified stocks as collateral for credit, but also to have certified (receipted) stocks as basis for receipts that can easily be traded (say, on commodity exchanges), and stocks that can act as security grains stocks.

In Tanzania a WRS has been successfully developed for agricultural export commodities (e.g., coffee) under a project supported by the Common Fund for Commodities. It is being extended to the major grain staples (maize and rice). The WRS has enabled smallholder producers to access remunerative, quality-sensitive commodity markets, and as a result smallholder groups of coffee producers in Tanzania obtained incremental income of about 70% per tonne of coffee marketed.

A WRS pilot for grains was implemented in Zambia prior to the start of the FARMAF project. In Zambia the scheme is not operational at the moment. Work is planned to better inform and equip the relevant organizations (Food Reserve and commodity exchange, and farmer organization) about the use of WRS for their purposes. WRS can also be used for other crops than maize, for example soy beans. For both countries, no plans are foreseen for a corresponding impact assessment.

As a result of FARMAF activities, WRS targeting smallholder farmers has been promoted in Burkina Faso. FARMAF funds enabled the construction of 7 warehouses in two provinces (Mouhoun and Tuy). New warehouses were randomly assigned to villages so as to compare their impact with those villages that are not selected. Eligibility is determined by the presence of a local farmer organisation, and an indication of interest in using the warehouse. The WRS are not linked with the commodity exchange, and the proposed decentralized implementation suggests that WRS is helpful in generating better access to credit, rather than as a tool to facilitate trade (or efficient bonded storage). The same household survey is used to measure the impact of WRS as for measuring the insurance impact and controls could be used for both risk management tools.

A baseline survey was conducted January 2013. In total, 694 smallholders were in the WRS treatment group (7 villages) and 280 farmers in the control group (10 villages). In October 2015 (or October 2016) a follow-up survey is planned to determine whether warehouses are able to facilitate access to credit by guarantying proper storage (and certification), and ultimately lead to higher prices. In principle, Burkina Faso provides a good opportunity to test the impact that WRS may have.

## 2.3 MIS

Most smallholder farmers in Africa lack access to reliable and timely market information. Providing prices in "real time" via market information systems (MIS) has become technically feasible thanks to information technology, which minimize transmission and diffusion delays. Timely information is intended to guide the choice whether producers' sells (selling now or later, changing point of sale) and strengthen their bargaining power in the event of immediate transaction.

Analysing the impact of MIS is more difficult than analysing the impact of other risk tools. The reason is that information spreads easily, so it is not straightforward to identify a proper control group against which the performance of a treatment group (with access to MIS) can be measured. One option considered is by comparing before-after rather than treatment-control. Alternatively, one may compare different crops, where MIS functions for one major traded crop but not for another (i.e., different sample frame). The indicator to be used in this case is the ease of trading in the former compared with the latter crop. But in both options, the impact measure bumps against the fact that information alone is often of little use, if the over whole marketing environment is too constrained (e.g., small individual amounts to sell, high transport cost, lack of credit market leading to interlinked input and products transactions). It is then the impact of joint services (like in the case of insurance and credit), that could be measured.

The quality of information that MIS generates can be measured by the correctness of information (is the published price or volume really representative for what is traded at this point of time?) and by the extent to which this information is recognized among a larger group of users. This latter aspect can be measured by collecting the views of stakeholders on the relevant prices (and other variables) at one specific date, and comparing the data thus gathered.

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Experiences in Burkina Faso, Tanzania and Zambia show that in each country, there is often a multitude of initiatives aiming to provide market information to smallholders. Many initiatives never left the pilot stage and became defunct after project financing ended. Other initiatives are still running, but recuperating costs of collecting information is usually their Achilles' heel.

Because of limited outreach, impact assessment of MIS within the FARMAF project at smallholder level was considered to be not feasible. Nonetheless, lighter methods of monitoring and assessment are tested in Burkina Faso to monitor market information availability. The intensity of use of MIS is a consistent indicator of its usefulness. With mobile phone devices, the evolution of number of users and the categories of information requested can be analysed, providing consistent indications on the consistency of the MIS to meet users need. Then, a light survey on a sample of the MIS users will be focused on a better understanding of users' needs, on they use of the information, on the limits of the service offered.

## **2.4 Capacity strengthening**

The role of farmer organisation has received increasing attention in recent years. Collective action to improve risk-management in agriculture is only possible when involved farmer organisations are well internally organised. FARMAF will assess how the capacity of involved farmer organisations (i.e., CPF, MVIWATA and ZNFU) has evolved. In 2014 a workshop was held in Burkina Faso to measure the capabilities of the organisation in managing research for advocacy on risk issues. The FARMAF self-evaluation tool is intended to create room for discussion within the NFO Board. We adapted the "five core capabilities framework" developed by Engel et al. (2007) (Ton et al., 2014). The evaluation of the change in capacities over time covers the period that FARMAF worked with most of the organisations. However, the process will not draw strong conclusions on impact and attribution of the changes in these capacities to FARMAF. The NFOs work in complex environments having many influencing factors. Changes in capacities are influenced by many more factors than research, and on more issues than those supported by FARMAF-funding and backstopping alone. Therefore, during the workshops, we will ask the board members and other stakeholders directly about the role of FARMAF activities in strengthening these capacities, and how to improve.

## **3 Lessons learned and challenges encountered**

There is a lack of information in the literature regarding the impact of smallholder risk management tools. Based on the FARMAF experience, we will elaborate on the methodological approaches which foster lesson-sharing and describe the encountered challenges. Assessing impact will not be limited to the specific tools but also the context in which they are developed.

The attribution of production changes to each source of change is the objective of an impact assessment. This requires an in-depth analysis. The ideal approach would be to measure the impact by means of a randomized controlled trial so that eventual differences between groups can be attributed to the risk management tool. However, most empirical studies are based on ex-post cross-sectional data. Such an approach is unlikely to yield unbiased assessment of impact. Moreover, research has focussed mainly on determinants of adoption rather than the impacts on adopters. Only a limited number of impact studies were conducted focusing on the risk management tools under study (e.g., Giné and Yang, 2009, Coulter, 2009 and Onumah, 2009).

Quantifying the isolating impact of many risk management tools such as insurance and warehouse receipt is inherently difficult since several modalities are bundled. Evidence on the role of the access to the finance part in WRS includes linkages to complementary actions such collective action and quality programmes. Impact assessment of insurance is often embedded with access to production finance and input supply as well as collective action and pre-harvest assessment.

Since smallholders do not have options to choose between modalities only two groups are distinguished (e.g., treatment group of smallholders with access to risk management bundle and a control group). Hence, the intervention is multi-dimensional.

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However, controlling for unobservable bias (such as motivation and entrepreneurial behaviour) ex-post is more challenging. Yet, if unobservables are not changing over time a simple double difference method can be used to control for selection biases due to unobservables. This, obviously requires before and after treatment data.

Experimental impact studies are more complicated for financial services which are not tied to local investments in infrastructure as WRS's. For example, financial institutions (e.g., MFI's and insurers) are reluctant to participate in an RCT design to study the impact of a credit-insurance bundles (prospective clients in control and treatment villages can apply for credit whereas smallholders in villages without WRS's do not easily join WRS's in other villages).

Given reluctance to conduct RCTs an alternative is to use encouragement designs. With an encouragement design uptake is encouraged (for example by marketing campaigns or visits by loan managers) for a random group of farmers (or a randomly chosen group of villages); but nobody will be excluded from uptake. If uptake is highly correlated with the randomly assigned encouragement, unbiased impacts can be measured (in line with a normal RCT). In Burkina Faso, insurance awareness campaigns and sales were randomly held in villages in which this financial service was not yet available. However, smallholders from other villages who were interested to insure themselves in order to obtain credit were not excluded from application by the MFI's and insurers if they were assigned to the control group.

The modalities of the tools need modified so as to test their individual effectiveness. Quantifying the attribution of each modality is more challenging than quantifying the overall impact. To study the impact of each modality would require a (full) factorial experimental design which is often practically infeasible or desirable. However, evidence to bear on how farmers' uptake of packages responds to composition and to price are useful in recommending improved packaging. These optimal packages can be attuned to groups of farmers.

Methodological challenges are often encountered to balance high validity research designs to real-world dynamics and constraints. Experimental studies control for selection bias by randomly allocating the introduction of a risk management tool to smallholders and uses the untreated group as a control group.

Experimental design are especially useful in controlling for unobservable differences, while observable differences can more easily be controlled for ex-post using advanced econometric methods. In practice random designs are often difficult to implement for practical or ethical reasons.

## **4 Policy environment impact assessment**

Recent reviews of initiatives to promote risk management tools demonstrated that the policy context – or the policy and regulatory framework, and public support – affects development and uptake. Moreover, the contribution of the policy context on the performance of tools is seldom assessed.

Public policy measures can also facilitate impact assessment actions (e.g., insurance products, WRS and MIS). Key requirement for any impact assessment framework is data availability. Often there is a general lack of information hampering impact assessment. Additional financial resources and time are required to establish first the baseline. Specific public measures to conduct regularly a census about production and prices from smallholders would help considerable.

## **5 Conclusion**

Impact assessment does require a great deal of work requiring targeted surveys over time among smallholders. However, an impact assessment offers scope for theoretical deepening in understanding the performance of risk management tools designed for smallholders.

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