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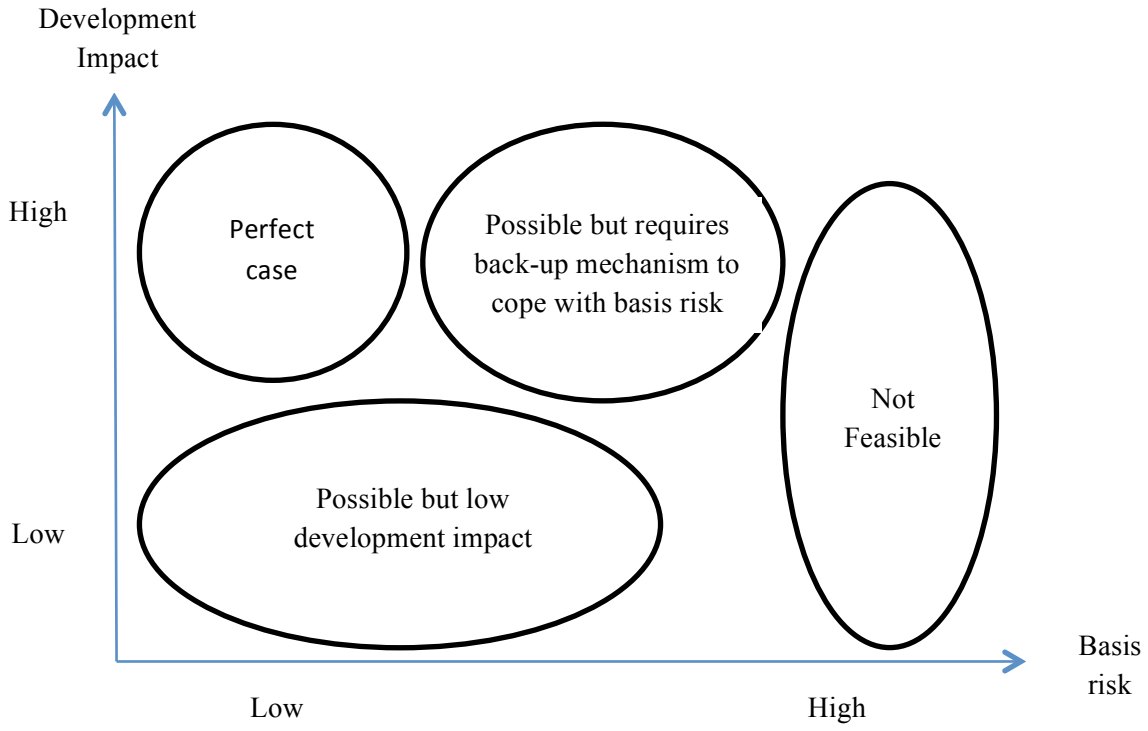
Feasibility Study on Agricultural Index Insurance in Nepal: Work Plan and Budget

The purpose of this note is to detail the different questions that a feasibility of index insurance in Nepal should address and describe the steps that must be completed before a pilot program can be launched. The objective of the feasibility study is twofold: we will

1. Determine where (which activities/regions/etc.) the development impacts of insurance-based risk management strategies would be maximized; and,
2. Assess whether there is appropriate and available data that is correlated with the identified agricultural outcomes (based on identified activities/regions/etc.) such that it can be used to create an effective index for an insurance product.

Our goal is to identify geographic areas and commodities that have both high potential for significant development impacts, as well as areas where there is data that can be effectively used to predict farmer outcomes and design an effective index insurance contract.

The diagram below illustrates our proposed approach. On the vertical axis, we take stock of potential development impacts of the region/activity. On the horizontal axis, we examine whether the available data can be used to accurately predict yields, and so the degree to which there is a measure that can be used effectively as an index (the right side has a high degree of "basis risk", or the risk that is not captured by the index). Our goal will be to identify those regions/activities for which there is a high degree of potential development impact, but a low degree of basis risk.



This question of basis risk is of particular importance because it will determine the value of index insurance for farmers. Indeed, if an index is well correlated to actual yield (to be precise, if the index captures the significant negative shocks of production), then the farmer can use this product to back-up investments expenses he would like to make on his farm. If he experiences a shock, insurance indemnities will allow him to repay his loan. But if the index is only moderately able to measure negative shocks, and therefore does not trigger a payout every time the farmer experiences significant losses from the insured shock, then the farmer might decide to not invest because it is unsafe, and not buy insurance because it is useless.

In Stage 1 of the feasibility study we will first look across a broad variety of commodities and areas and create a short list of those commodities/areas where insurance can have large impacts by crowding in new investment and prudential risk-taking by small-scale farms. In Stage 2, we will more closely examine the areas and crops that we have identified as the most promising to determine whether an effective index insurance contract can be designed. The completion of Stage 2 will thus have identified the best candidate for index insurance, which can then be carried into the next tasks, including full contract design and pilot.

The remainder of this note provides further detail on these first two stages and presents a preliminary budget estimate.

Stage 1 – Selection of areas and crops where the development impacts of insurance are highest

Main agricultural activities we will consider will include wheat, corn, rice, livestock in horticulture, for the Terai, Shiwalik and Hill regions. In the first stage of the feasibility study, we will consult experts in Nepal to identify which regions and which agricultural activities are the most severely affected by risk. We will consider the impact of risk on a target population in two ways. The first will be risk to catastrophic shocks, and that experiencing these shocks may push households into poverty. The second is opportunities lost due to risk. Households facing a high degree of risk may shy away from risky but potentially profitable opportunities. As such, development impacts may come both from the stabilizing force of insurance when shocks occur, but also through enabling households to better manage risk so that they can invest in productive technologies.

Stakeholder meetings will be conducted with experts in the field. Participants will include, among others, the USAID local team, the Ministry of Agriculture and the Office of Statistics. Our information gathering activities will concentrate on:

- Maps of areas prone to suffer from climate related catastrophes
- Sensitivity of different agricultural activities to climate variability
- Existence of other insurance products available to farmers; we want to focus our efforts on farmers who are usually excluded from the insurance market.
- Yield performance compared to neighboring countries for different activities. A large yield gap would mean that significant yield improvement could be achieved if the appropriate technology was implemented.

- Opportunities available for the adoption of under-utilized improved technologies that could increase productivity (and in turn increase incomes and reduce poverty)
- Access to credit and other financial services by region/activity; farmers need funding sources to invest in improved technologies.

Such information will allow us to estimate both *ex post* (if a catastrophe happens) and *ex ante* (when catastrophes did not happen yet) potential impacts of insurance for each possible study area and activity.

During this stage, we will also hold introductory meetings with stakeholders, including Nepali financial organizations, others nongovernmental organizations working around index insurance in Nepal (including the World Bank and the International Rice Research Institute), and Nepalese policy makers (to better understand the current policy and regulations regarding insurance in Nepal, and to analyze what changes or reforms might be needed). These meetings will be dedicated to information gathering about the situation in Nepal today, but also to the reasons why agricultural insurance has not been undertaken in Nepal in the past.

Stage 1 will also include an assessment of data availability for each considered commodity and each region. Because the availability of data plays a crucial role in the development and testing of the predictive powers of an index for a given commodity, the availability of such essential data should be verified before determining which commodities and regions should be carried into Stage 2.

By the end of this stage, we will have identified one or two commodities in one or two regions that we believe to be promising targets for an index insurance project. We can then move ahead to Stage 2, if BASIS and USAID-Nepal concur, to further design and test the feasibility of an index insurance contract for these identified commodities and regions.

Stage 2 – Design and testing of a reliable insurance index

The second stage of the feasibility study will focus on the most promising regions and activities for development impact identified in stage one, and evaluate each of them to assess the potential to develop an effective index insurance product. It is possible that some activities have high potential for development impacts with risk management tools, but that index insurance cannot be designed in a way to cover enough risk that local partners (insurance companies, lenders, etc.) are interested in offering this kind of opportunity to this group. This stage then, will try to identify which of the areas and activities identified in stage one also have potential for a feasible and effective index insurance contract design that will successfully cover risk.

Here, our work will consist in four tasks:

1. **Data Collection:** First, we will gather highly disaggregated data from household surveys, village/district statistics, processing industry, etc. The objective is to build a dataset of historical yield that covers a large number of villages and many years. This dataset is of particular importance because it will later be used to compare the proposed indices and historical yield. Because high quality disaggregated and geo-referenced data is essential for the development of the index, we will likely need to organize our own survey of farmers in the areas under investigation. This survey would consist in the collection of

recall yield data with a particular attention to the losses experienced during very bad years.

2. **Correlation of historical data with proposed index data:** Second, based on the data collected and experts' advice, we will take the identified "high potential impact" areas and activities and determine whether there is available data that can indeed produce an index that is effective in predicting actual average yields. During this step, we will consider a variety of different possible indices, including traditional weather-based indices (such as rainfall), area yield indices, and remote sensing technology (such as that found at SERVIR). The decision regarding most promising index depends on numerous factors from cloud coverage in the region to the fragmentation of land (for example, whether plots are clustered together or disbursed among other fields where other crops are grown). Ultimately, we need to identify the areas and activities for which there is not only high potential development impact, but for which we can identify an accurate predictor of actual yields that can feasibly be used as an index.

3. **Contract design**: Our third task consists in an analysis of contract design options. Ideally, we would be able to develop a contract that has very low basis risk if we have identified data that is very accurate in its predictions of farmer outcomes. It is possible, however, that for the most promising development impact areas and activities, index insurance can only capture a moderate share of risk, so that basis risk is medium. If such a case arises, index insurance could be backed-up by some mechanism that reduces basis risk by giving farmers another opportunity to be compensated for losses that were not predicted by the satellite data. One example of such a mechanism would be to allow farmers to petition for a crop cutting exercise when the index does not accurately capture a significant loss. When the petition receives enough signatures, an expert is sent to the area where he analyzes some fields picked at random. He can then decide that indemnities should be paid or not to farmers. This adds a layer of protection for the farmers from experiencing significant losses that are not predicted by the index's data. Such contract designs will be considered in this stage of the feasibility study.

4. **Financial Partners**: The final task in Stage 2 will be to initiate discussions with potential financial partners (insurance companies, lenders) to assess their interest in the product(s) that our preliminary assessment highlights as the most promising. These discussions can include (i) a presentation of the concept of index insurance, (ii) the technical details of the product offered, (iii) the presence of the partner in the project area and (iv) how index insurance can improve access to credit for farmers.

Timeline and Budget

Using its core budget that supports post-doctoral scholar Thomas Barré to assist USAID missions with the development of index insurance programs, BASIS is prepared to share the costs of the proposed feasibility study. BASIS Director Michael Carter and Assistant Director Tara Steinmetz will also contribute time to the proposed feasibility study. The table below lists the direct, non-personnel costs of implementing the proposed feasibility study.

Risks

There is a risk that conditions in Nepal or the technical details of the satellite technology will not allow for a feasible contract. Given our preliminary research to date, however, we anticipate that by the end of this feasibility study we will have identified a few strong candidate locations and activities where the potential for development impact is high and the contract designs are technically sound and feasible. Once these steps have been completed, a pilot project could be launched fairly quickly.

Pilot Stage and Impact Evaluation

If the first two stages are successful in designing one crop/area suitable for a pilot project, the BASIS/I4 team could help the USAID mission implement the program and evaluate its impact on Nepalese farmers. The impact evaluation work allows us to measure the changes in outcomes of interest (income, investment, input use, consumption, etc.) that are due to the introduction of index insurance to help them manage climate risk. The evaluation strategy relies on the comparison of a "treatment group" who is offered index insurance and a "control group" who is excluded from the program during the pilot stage. The control group is then integrated into the program as it expands to new regions and reaches scale.

Team Composition

Michael R. Carter is Professor at the University of California-Davis and Director of BASIS (Feed the Future Assets and Market Access Innovation Lab). Professor Carter has been involved in many index insurance projects in Kenya, Mali, Burkina Faso, Tanzania, Dominican Republic, etc. and is also Director of the I4 – Index Insurance Innovation Initiative, whose objective is to design and implement index insurance contracts for the poor in order to improve livelihoods by increase technology uptake by farmers, thus increasing incomes, developing rural credit markets and breaking the dynamics that make rural families trapped into poverty. Professor Carter will be the coordinator of the feasibility study in Nepal and will be mainly involved in (1) the identification of potential impacts of index insurance on candidate commodities, (2) the identification of the commodities for which basis risk would be minimum, (3) the design of the product for the selected commodity and (4) the conversations with the local financial sector (insurance and lenders) and the local authorities.

Tara Steinmetz is Assistant Director at BASIS and holds a Master degree in Public Policy from Duke University. She will be mostly involved in conversations with the local financial sector (insurance and lenders) and the local authorities and in the coordination of the study.

Thomas Barré is Post-Doctoral fellow at I4, in charge of the development and evaluation of innovative index insurance solutions. Thomas will be in charge of (1) data collection, (2) the identification of potential impacts of index insurance on candidate commodities, (3) the identification of the commodities for which basis risk would be minimum, (4) the design of the product for the selected commodity and (5) the conversations with the local financial sector (insurance and lenders) and the local authorities.

The I4 team will also identify a local partner (local NGO, FAO office, Ministry of Agriculture, University, etc.) able to support it in its efforts of data gathering and identification of the characteristics of each commodity. If the feasibility study is successful, the I4 will pursue its cooperation with this partner or, if necessary, identify another partner whose activities are more focused on the chosen commodity.

Appendix

Despite its high potential impacts of farmers' activities and livelihood, *conventional insurance* often fails to reach poor farmers because of its cost and complexity. Indeed, conventional insurance requires that when a disaster happens, the farmer fills a claim for indemnity and send it to the insurance company. Then, the insurer sends an expert to the farmer's field in order to assess the loss and confirm its origin. If the expert confirms that the farmers experienced a significant loss and that this loss is due to a risk that is covered by the insurance policy, the farmer receives an indemnity that covers a share of his loss. This process is long and costly as it relies heavily on experts' assessments. Also, it is sometimes difficult for the expert to make sure that the farmer did everything in his power to minimize the loss and it can create resentment towards the expert. For the insurance company, this is a problem of *moral hazard*: farmers can have incentives to exaggerate their losses in order to get a subsidy higher than due. In order to cover the cost of these behaviors insurance companies charge higher premiums, which makes insurance only attractive to the farmers who are the most exposed to risk. This *adverse selection* effect increases the premium further and this vicious circle leads to an equilibrium where only very rich farmers can afford insurance and insurance is valuable only to the highly exposed farmers. The demand is minimized and the insurance market cannot be sustained.

In order to break this vicious circle of high premium/highly exposed farmers, governments subsidize insurance. In the case of Nepal, the government subsidizes 50% of the premium and set the premium at 6%. This model makes agricultural insurance hardly profitable for the insurance companies, so instead, we propose to work with an innovative insurance tool, *index insurance*.

Index Insurance focuses on large shocks that affect the entire village/community because these are the kind of shocks that often hurt farmers most (our preliminary work in Stage 1 will verify if this is the case in Nepal). Instead of asking experts to evaluate individual losses, an *index* estimates the average yield in the area. If this index passes below a given threshold (i.e., the index predict below average yields), every insured farmer in this area is indemnified for the loss predicted by the index. Such approach reduces the cost of insurance and solves the moral hazard and adverse selection issues. However, index insurance also suffers from one important drawback: *basis risk*. The basis risk is the part of the risk that the farmer bears but which is not captured by the index. There exist two sources of basis risk than can all be minimized by applying the right methods:

- *Idiosyncratic risk*: This is the part of the risk that is purely individual, when a farmer suffers a shock while the rest of the village gets normal yield. Index insurance cannot protect farmers against such risk. In other BASIS projects where idiosyncratic risk was determined to be significant, BASIS/I4 projects found ways to minimize this issue by complementing existing community risk management arrangements.
- *Design Risk*: It is possible that the index fails to accurately predict the average yield in the area. This can be the case if geographical coverage is inappropriate (for example, one single index for an entire country) or if the index cannot capture the impact of some disasters (for example, an index based on rainfall data cannot indemnify farmers in times of frost). The BASIS/I4 team has experience with every kind of potential index (area yield, weather based, remotely sensed vegetation indices, etc.) and will test all available and appropriate possibilities against yield data to determine the best model for Nepal.