**Documentation on choice cards**

Important attributes of an insurance-bundled credit product were identified by careful review of related literature, farmers opinion in focus group discussions, meetings with bank and insurance company managers, and consulting the scientific design team. The team came up with nine attributes for our choice experiment thought to be the most important characteristics that farmers, lenders and insurer would naturally consider. The attributes under investigation are: 1) insurance cost, 2) insurance payment, 3) insured risk coverage, 4) credit term, 5) collateral requirement, 6) loan repayment flexibility, 7) loan use flexibility, 8) preferred season for loan, and 9) rainfall measurement. A summary of the choice experiment attributes and their corresponding levels are presented in Table 1

Table 1 Choice experiment attributes and corresponding levels

|  |  |
| --- | --- |
| **Attributes** | **Levels** |
| Insurance cost for borrowing 10,000 KSH loan | 500 KSH (5%), 1000 KSH (10%), 2000 KSH (20%), 3000 KSH (30%) |
| Insurance payment | Premium added to loan, Pay premium separately |
| Insured risk coverage | **Low coverage** (covering rare risk, 1 in 20 years),  **Medium coverage** (covering medium risk, 1 in 10 years),  **High coverage** (covering frequent risk,1 in 4 years) |
| Credit term (length of loan) | **Short** (up to 6 months, e.g. until harvest),  **Medium** (6 months to 1 year),  **Long** (more than 1 year) |
| Collateral Requirements | No collateral required, Partial collateral required, Full collateral required |
| Flexibility in loan repayment | Make monthly repayments, Repay at time of harvest only |
| Flexibility in loan use | Loan can be used for any purpose, Loan can only be used in agricultural production |
| Preferred season for loan | Long rain, Short rain, Both |
| Rainfall measurement based on | Total rainfall shortage for a season,  Rainfall shortage measured at various stages of crop growth cycle (vegetative, reproductive, and ripening stages) |

To construct the choice sets, we specified D-Optimality criterion using the Federov search algorithm which is based on calculating the determinant of variance-covariance matrix of the parameters from non-linear logit model. Choice sets were constructed with three alternatives available for respondents to choose. For the main effect model the number of parameters we needed to estimate were,



Based on the experimental design we needed at least 24-9+1= 16 parameters to estimate. However, consideration of interaction effects increased the number of parameters required for efficient estimation. As proposed by Orme (1998), Johnson and Orme (2003), and Rose and Bliemer (2013), a common rule of thumb for an estimate of the sample size required for a main effect choice experiment should be ,where S is the number of choice tasks presented to each respondent (9, in our case), J is the number of alternatives per choice task (3 in our case), and  is the largest number of levels of any of the attributes (4, for insurance cost). Therefore, based on this, we should have at least 75 individuals in our sample. The values of S and J can be determined exogenously but should satisfy the rank condition, S(J-1)>K, where K is the number of parameters to be estimated. Estimating only main effects can lower the values for S and J, but this precludes any consideration of correlated or heterogeneous preferences. With the full set of interactions, the rank condition would be violated. In addition to problems with estimability, it also becomes increasingly difficult to get a suitable experimental design. To satisfy the rank condition we elected a protocol with three alternatives per choice set, and with each respondent responding to nine choice sets.

To ensure data reliability, we placed special emphasis on increasing farmers’ understanding of and involvement in tasks. Thus, we included pictorial illustrations of the product attributes and their levels in the choice cards to facilitate respondents’ choice task (see an example of choice card presented to participants in Figure 2). To reduce the response burden and fatigue on the participating households we grouped the choices sets into six groups of nine choice sets each. The households were then randomly assigned to the choice sets presented in one of the six groups, with equal proportion of households allocated to each of the groups. Since we have nine attributes a full profile design may lead to cognitive burden and response fatigue. To overcome this problem, we use partial profile designs allowing only five variables to vary on any one card.