Annex A. Choice Experiment Section of the Survey

Introduce the choice experiment

We would like to know what is important for you when you choose to grow a crop, or when you choose different techniques to grow a crop. We will proceed with a series of choices to be made.

Each time, you will be presented 3 cropping system (hereafter we will simply call it a crop), your current crop (maize) and 2 other crops (it could be maize grown differently, but it could be another annual crop). Each crop is presented with 5 characteristics: income, the labor needed, the cash outflow needed, the impact on soil fertility and the risk of failure. We will present 6 scenarios and each time you will have to choose only one crop from the 3 proposed to you.

Think carefully about the consequences of introducing these new crops on your farm. How it would influence the organization and performance of your farm. As only one system is possible, you need to remember that growing one crop would prevent you from growing the others proposed.

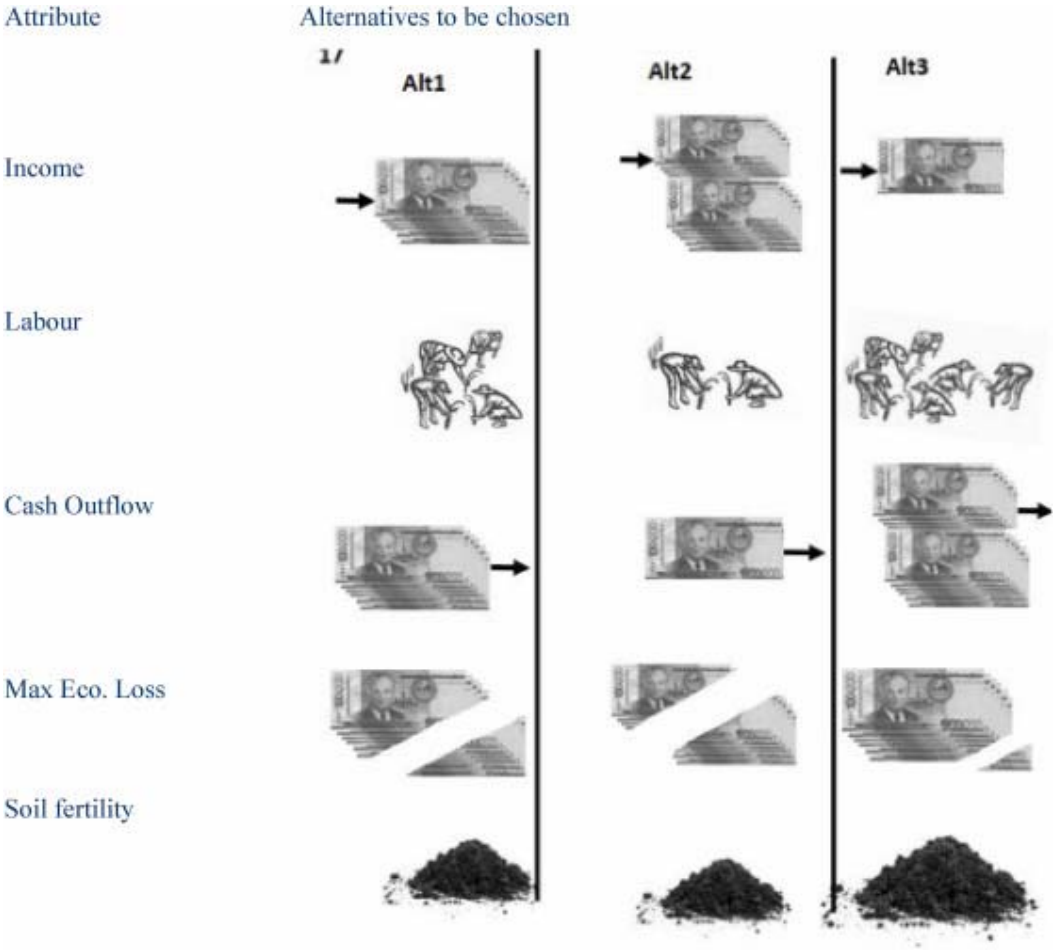
Please also note that, from our point of view, **there is no good or bad choice**. We are only interested in your point of view and your choices, since it would help to identify crops or cropping systems that would fit your needs and preferences.

Describe and discuss the crop attributes with the farmer (together with the sheet of drawings)

1) The “Income” parameter refers to the potential benefit that you can have once your income = total yield*price. The number 100 is taken to be the same benefit that you have with maize. 80 means that for every 100 LAK that you earn from maize, you will earn 80 from this crop. 150 means that for every 100 LAK that you earn from maize, you will earn 150 from this crop.
2) The “Labour” parameter refers to the total amount of time that you (or your family members) have to spend on this crop. The number 100 is taken to be the same amount of work that you have to do with maize. 80 means that for every 100 man-days that you spend for maize, you will only spend 80 for this crop. 150 means that for every 100 man-days that you usually spend for maize, you will spend 150 for this crop.
3) The “cash outflow” parameter refers to the money that you need to spend for a crop during the cropping season (for the inputs, land preparation, seeds etc.). The number 100 is taken to be the same amount that you have to spend for maize. 80 means that for every 100 LAK that you spend for maize, you will spend only 80 for this crop. 150 means that for every 100 LAK that you spend for maize, you will spend 150 for this crop.
4) The “risk” parameter means the risk of having to endure a large income loss (during a bad year). There are three possible risk scenarios: under the current crop, we estimated that you could lose a maximum of 400,000 LAK/ha during a bad year. Cultivating another crop could lead to the same loss risk (400,000 LAK/ha during a bad year), or higher (2 M LAK/ha), or lower (200,000 LAK/ha)

5) The “fertility” parameter means the influence of the crop on soil fertility. Soil fertility could a) remain the same, i.e. the crop does not improve or degrade the soil, b) improve over time, or c) decrease over time (the crop degrades the soil)

Explain the relationship between the pictures and the attribute[5]



Depending on the block, present the six choice sets successively (the cards are numbered with the no. of the set) and collect the choices.

Annex B. Conditional logit model with non-linear preferences for labour, cash outflow, and maximum economic losses

Table B1. Conditional logit coefficient estimates with nonlinear preferences for all attributes

Attributes	**Coefficient†**	**St. Error**	**t values**	**Pr(>|t|)**
No Change (status quo)	0.136	0.575	0.237	0.813
Other Alternatives††	−0.136	0.575	0.237	0.813
Income (less)	−1.364	0.187	−7.274	0.000
Income (base) ††	0.879	0.215	4.086	0.000
Income (more)	0.485	0.206	2.358	0.018
Labour (less)	0.750	0.153	4.894	0.000
Labour (base) ††	0.280	0.163	1.716	0.086
Labour (more)	−1.030	0.188	−5.484	0.000
Cash outflow (less)	1.166	0.371	3.141	0.002
Cash (base) ††	−1.302	0.686	−1.897	0.058
Cash outflow (more)	0.137	0.396	0.345	0.730
Max Economic Loss (lower)	0.519	0.211	2.456	0.014
Max Economic Loss (base) ††	0.144	0.209	0.690	0.490
Max Economic Loss (higher)	−0.663	0.098	−6.796	0.000
Fertility (higher)	1.675	0.142	11.796	0.000
Fertility (no change) ††	1.159	0.211	5.506	0.000
Fertility (lower)	−2.834	0.292	−9.703	0.000
Log Likelihood (LL)	−556.67			
LL (constants only)	−773.86			
AIC	1135.35			
BIC	1185.73			
D-Error	0.0172			

† The attributes status quo, benefit, labour, cash outflow, maximum economic loss, and fertility were effect coded.

†† The coefficient of the base level for each attribute were calculated as the negative of the sum of the coefficients for the other levels. Their standard deviation were calculated using the Delta method.

Annex C. Identification of Attribute Non-Attendance using the latent class choice model with unequal grid (Vij and Krueger, 2017)

We ran the Vij and Krueger model with unequal intervals and three mass points to characterize the distribution of the Alternative Specific Constant (ASC) coefficient that describes the status quo alternative, four mass points to characterize the distribution of the income, labour, cash outflow and maximum economic loss coefficients, and two mass points to characterize the distribution of the high and low fertility coefficients. We also imposed constraints on the signs of the preference coefficients (negative for the *labour*, *cash*, *max. economic loss* and *lower fertility* coefficients, positive for the *income* and *higher fertility* coefficients). The starting values for the boundaries of the grid for each coefficient are presented in Table A1.

Table C1. Starting values for the boundaries of the hi-dimensional parameters grid

	Lower Bound	**Higher Bound**
ASC	−3	0
Income	0	1
Labour	−2	0
Cash outflow	−2	0
Maximum Economic Loss	−2	0
Lower Fertility	0	4
Higher Fertility	−4	0

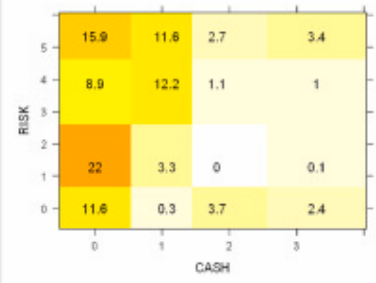
The estimated location of the mass points used to evaluate the random preference coefficients are presented in Table A2. The results indicated that latent class choice model with unequal grid was able to uncover patterns of ANA and to distinguish it from low sensitivities to the same attributes. In particular, the results suggested that ANA was used as a decision rule with respect to the two attributes *cash* and *maximum economic loss,* with 58% and 18% of the sample population likely insensitive to those attributes.

The model results also suggested that all individuals attended other attributes but with contrasted patterns. The fertility attribute was always attended and the location of the mass points suggested high preferences for these attributes. By contrast, for the income and labour attributes, a significant proportion of the population seemed to have a very small sensitivity to these attributes with 42% and 62% share for the close to zero income and labour mass points. Lastly, the joint probability mass function (Figure A1) suggests that around 12% of the sample population ignored simultaneously the risk and cash attributes.

Table C2. Estimated location and marginal probabilities of each of the mass points along the random taste coefficients under the latent class choice model with unequal grid specification.

Based on these results, we retained three ANA patterns (cash outflow NA, maximum economic loss NA, and cash outflow + maximum economic loss NA) for further investigation.

	Points	**Est.**	**St. Err.**	**Share (%)**
ASC	1	6.08	1.02	29
	2	−1.15	0.55	36
	3	1.21	0.32	35
Income	1	0.11	0.07	42
	2	0.52	0.07	22
	3	1.52	0.09	20
	4	2.31	0.11	16
Labour	1	−3.75	0.13	9
	2	−2.13	0.10	7
	3	−1.12	0.08	23
	4	−0.14	0.06	61
Cash outflow	1	−3.30	0.15	7
	2	−1.82	0.10	7
	3	−1.07	0.10	27
	4	0.00	0.07	58
Max. Economic Loss	1	−5.34	0.52	34
	2	−3.88	0.68	23
	3	−1.29	0.40	25
	4	0.00	0.26	18
Lower fertility	1	−13.55	0.92	73
	2	−8.02	1.02	27
Higher fertility	1	4.87	0.46	50
	2	11.59	0.56	50
Log Likelihood (LL): −475.32				



	Joint Probability
Full Attendance	35.3%
Cash outflow NA	46.7%
Max. Economic Loss NA	6.4%
Cash outflow + Max. Economic Loss NA	11.6%

Fig. C1. Joint probability mass functions for the cash outflow and maximum economic loss parameters

Annex D. Identification of Elimination-By-Aspects

First, we estimated a RUM-EBA model with five EBA classes (each class corresponding to EBA related to one attribute). The results are presented on the left side of Table D1 and suggested that the probabilities associated with EBA-cash outflow, and EBA-maximum economic loss were very small and not significant. Therefore, we estimated a second RUM-EBA model with one full compensatory class and the three remaining EBA classes (right side of Table D1).

This second RUM-EBA model improved the likelihood to −532.4 from −581.9 for the conditional logit, but using 14 additional parameters. Despite this important increase in the number of parameters, it showed an improvement in terms of Bayesian Information Criteria.

Table D1. Estimated parameter of the latent class model considering only Elimination by Aspects

	EBA All EBA Classes considered			**EBA INCOME/LABOUR/FERTILITY**		
Attributes	**Est.**	**Std. Err.**	**Sig.**	**Est.**	**Std. Err.**	**Sig.**
Preference Class 1						
ASC	−0.507	0.381		−0.933	0.227	***
Income	0.077	0.084		0.161	0.051	***
Labour	−0.286	0.126	***	−0.065	0.061	
Cash outflow	−0.037	0.113		−0.035	0.081	
Max. Economic Loss	−1.786	0.391	***	−0.468	0.119	***
Lower Fertility	2.127	0.457	***	1.832	0.337	***
Higher Fertility	−3.262	0.837	***	−1.820	0.652	***
Preference Class 2						
ASC	−0.945	0.215	***	−0.397	0.342	
Income	0.158	0.050	***	0.074	0.080	
Labour	−0.067	0.060		−0.252	0.120	***
Cash outflow	−0.026	0.082		−0.072	0.099	
Max. Economic Loss	−0.479	0.118	***	−1.688	0.339	***
Lower Fertility	1.939	0.386	***	2.076	0.460	***
Higher Fertility	−2.051	0.761	***	−3.080	0.843	***
Class Probabilities						
RUM (1)	0.0237	0.0708		0.1823	0.1341	
EBA - Income (1)	0.0776	0.0353	***	0.0645	0.0382	*
EBA – Labour (1)	0.1175	0.0505	***	0.0024	0.0075	
EBA – cash outflow (1)	0.0374	0.0504				
EBA – maximum economic loss (1)	0.0029	0.0093				

EBA – Lower fertility (1)	0.045	0.0971		0.4272	0.162	***
RUM (2)	0.2202	0.2022		0.0249	0.0811	
EBA – Income(2)	0.0697	0.0376	*	0.0736	0.0363	***
EBA – Labour (2)	0.0028	0.0087		0.1235	0.0491	***
EBA – Cash outflow (2)	0.0226	0.0504				
EBA – Maximum economic loss(2)	0.0025	0.0077				
EBA – Lower fertility (2)	0.3781	0.2354	*	0.1017	0.1063	
Model statistics	K = 25; LL = −532.53; AIC = 1,115.07; BIC = 1,229.55			K = 21; LL = −532.41; AIC = 1,106.83; BIC = 1,202.99		

Annex E. Stability of classes when eliminating classes with small posterior probability of occurrence

Table E1. Estimates of model with two preference classes and six heuristics†.

Attributes	**Estimate**	**St_Error**	**t values**	**Pr(>|t|)**
Preference Class 1				
No Change (status quo)	−1.215	0.392	−3.101	0.002
Income	0.370	0.120	3.078	0.002
Labour	−0.292	0.117	−2.501	0.012
Cash outflow	−0.317	0.172	−1.849	0.064
Max. Economic Loss	−0.762	0.183	−4.163	0.000
Higher Fertility	0.132	0.898	0.147	0.883
Lower Fertility	1.576	0.493	3.197	0.001
Preference Class 2				
No Change (status quo)	−0.416	0.194	−2.148	0.032
Income	0.147	0.046	3.174	0.002
Labour	−0.066	0.056	−1.172	0.241
Cash outflow	−0.023	0.063	−0.367	0.714
Max. Economic Loss	−1.659	0.225	−7.363	0.000
Higher Fertility	−2.794	0.573	−4.877	0.000
Lower Fertility	1.883	0.303	6.210	0.000
Class parameters				
RUM1	−2.906	2.062	−1.409	0.159
ANA-CASH1	−1.331	0.825	−1.614	0.107
EBA-FERT1	0.870	0.666	1.306	0.191
RUM2	−2.054	3.626	−0.566	0.571
ANA-MEL2	0.440	0.677	0.650	0.515
EBA-INC2	−1.069	1.020	−1.049	0.294

EBA-LAB2	−0.012	0.673	−0.018	0.986
EBA-FERT2	0	0	0	0
No. of parameters	21.0			
AIC	1082.86			
BIC	1179.03			
D-Error	0.0563			

† The combination of preference class and heuristic was based on the results of model presented in the paper where we kept the combination that had significant mean posterior probabilities.

Table E2. Prior probabilities of latent classes

Class	**Prob.**	**St. Error**	**Z**		
RUM1 †	0.008	0.199	0.041	0.967	
ANA-CASH1	0.039	0.080	0.490	0.624	
EBA-FERT1	0.355	0.073	4.860	0.000	***
RUM2 †	0.019	0.324	0.059	0.953	
ANA-MEL2	0.231	0.070	3.294	0.001	***
EBA-INC2	0.051	0.087	0.584	0.559	
EBA-LAB2	0.147	0.058	2.530	0.011	**
EBA-Fert2	0.149	0.107	1.385	0.166	
No. of parameters	21				
AIC	1082.86				
BIC	1179.03				
D-Error	0.0563				

†† The probability of the full compensatory models were not significant in most models, but are kept since they are needed to evaluate the preference coefficients.