**Table 3.3 Conceptual Attributes and their levels**

|  |  |  |
| --- | --- | --- |
| **Attributes**  | **Potential levels**  | **References**  |
| Policyholders  | Individuals, groups, | ([Sibiko et al., 2017](#_ENREF_176)) |
| Strike levels  | Range of strike levels from 15% to 30% | ([Chantarat et al., 2013](#_ENREF_44)) |
| Transparency  | Provide regular information regarding index performance  | ([Schwarcz, 2013](#_ENREF_171); [Sibiko et al., 2017](#_ENREF_176)) |
| Bundled insurance  | Credit, savings  | ([Akter et al., 2016b](#_ENREF_10); [Farrin & Miranda, 2015](#_ENREF_69)) |
| Subsidized premium  | Different subsidy rates from 20% to 50%  | ([Carter et al., 2017](#_ENREF_39)) |
| Insurance Provider | The central government, private insurance companies, micro-credit providers, and local cooperatives. | ([Brouwer & Akter, 2010](#_ENREF_32)) |
| Basis Risk  | Range of predicted percentage of index errors  | ([Clement, Botzen, et al., 2018](#_ENREF_46); [Vroege et al., 2019](#_ENREF_202)) |

**Table 3.4 Attributes and Levels**

|  |  |
| --- | --- |
| **Attributes**  | **Levels**  |
| Transparency  | Receive Weekly Updates, No Weekly Updates |
| Premium to pay  | 100 ZAR, 250 ZAR, 400 ZAR |
| Reimbursement method  | Feed, Cash, Voucher |
| Basis risk  | 1 out of 10 times, 2 out of 10 times, 3 out of 10 times |

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**Table 3.1 Example of the choice card for a trigger level set at 30%**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Contract A** | **Contract B** | **Option C** |
| Reimbursements will be paid as: |  FeedA bale of hay in a field  Description automatically generated |  CashA picture containing text  Description automatically generated |  Stay without Insurance |
| Transparency | No Weekly UpdatesIcon  Description automatically generated | Receive Weekly UpdatesA picture containing logo  Description automatically generated |
| Basis Risk | 8 out of 100 times  | 12 out of 100 times  |
| Premium to pay  |  250 ZARA close-up of a currency note  Description automatically generated with low confidence |  100 ZARA close-up of a dollar bill  Description automatically generated with low confidence |
| The reminder of trigger levels and their expected compensation |
| PastureDegradation | 0% | 20% | 25% | 30% | 35% | 40% | 45% | 50% | 55% | 60% | >60% |
| Compensation (ZAR) | 0 | 0 | 0 | 2500 | 2917 | 3333 | 3750 | 4167 | 4583 | 5000 | 5000 |

**Table 4.1**  **Summary Statistics**

|  |  |  |  |
| --- | --- | --- | --- |
| **Statistic** | **Description**  | **Mean** | **Standard deviation**  |
| Age | Number of years  | 56.28 | 14.78  |
| No education | Dummy  |  0.39 |  0.46  |
| Primary education | Dummy  |  0.24 |  0.43  |
| Secondary education | Dummy  |  0.40 |  0.49  |
| Tertiary education | Dummy  |  0.07 |  0.26  |
| Herd size  | Number of livestock  | 18.35 | 14.25  |
| Arable land | Hectares  |  2.77 |  2.57  |
| Household size | Number of households  |  5.44 |  1.95  |
| Male | Dummy  |  0.61 |  0.49  |
| Female | Dummy  |  0.39 |  0.49  |
| Drought occurrences in the past five years  | Number of years  |  2.39  |  1.15 |
| Drought-related livestock mortality | Number of livestock mortality  |  5.66 |  7.67  |
| Access to formal credit | Dummy |  0.33 |  0.47  |
| Social grant beneficiaries | Number of efficacies  |  0.46 |  0.50  |
| Number of years in farming | Number of years  | 11.89 |  7.91  |
| Income | ZAR (US dollars)  | 75,259.41 (5,017.29)  | 60,087.07 (4005.80)  |
| Number of respondents  | 110  |  |  |

*The author collected primary data*

**Table 4.2** **Mitigation and Coping Mechanisms for Drought used by farmers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Mitigation Mechanisms** | **N (%)** | **Coping Mechanisms** | **N (%)** |
| Use rotational grazing | 89 (88.10%)  |  Ask for external support | 64 (63.40%)  |
| Store feed | 74 (73.30%)  |  Government relief | 52 (51.50%)  |
| Resistant breeds | 54 (53.50%)  |  Reduce stocking rate | 46 (45.50%)  |
| Mixed farming | 48 (47.50%)  |  Sell livestock | 40 (39.60%)  |
| Sell stock more often | 44 (43.60%)  |  Migrate | 35 (34.70%)  |
| Save money | 35 (34.70%)  | Draw from saving | 26 (25.70%)  |
| Rainwater harvest | 34 (33.70%)  | Take credit | 4 (4.00%)  |
| Plant pasture | 7 (6.90%)  |  Increase daily labour | 1 (1.00%)  |
| Buy insurance | 0 (00.00%)  | Insurance compensation | 0 (0.00%)  |

*The author collected primary data*

**Table 4.3 Reason for not purchasing insurance**

|  |  |
| --- | --- |
| **Reason for not purchasing insurance**  | **N (%)** |
| It is expensive | 69 (63.00%) |
| I lack trust in insurance, | 2 (1.80%) |
| It takes a long to pay | 3 (2.70%) |
| I do not need it. | 15 (14.00%) |
| I do not have the information | 21 (19.00%) |

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**Table 4.4 Farmer's perception regarding drought management**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Questions  | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree  |
|  I have recorded livestock mortality in the past 5 years due to drought | 45,5% | 18,8% | 18,81% | 16,83% | 0,00% |
|  I do not have the full capacity to deal with drought | 54,46% | 8,91% | 3,96% | 31,68% | 0,99% |
| The impact of drought complicates my farming business | 60,00% | 20,00% | 15,00% | 5,00% | 0,00% |
| I have received drought relief from the government in the past years | 0,00% | 11,88% | 4,95% | 76,24% | 6,93% |
|  I can deal with the impact of drought on my own | 0,00% | 23,76% | 6,93% | 29,70% | 39,60% |
|  I am willing to pay for index insurance as soon as it is available | 5,94% | 51,49% | 2,97% | 37,62% | 1,98% |
|  Drought is frequent in my area | 64,36% | 2,97% | 1,98% | 30,69% | 0,00% |

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**Table 4.5** **Distribution of risk-aversion**

|  |  |  |
| --- | --- | --- |
| Risk-taking Scale (0-10) | R1: General  | R2: Animal management  |
|  | N | % | N | % |
| 0 | 14  | (13.86%) | 9  | (8.91%)  |
| 1 | 2  | (1.98 %)  | 0  | (0. 00%) |
| 2 | 4  | (3.96%)  | 2  | (1.98%)  |
| Total Risk averse (0,1,2) | 20 | (19.9%) | 11 | (10.89%) |
| 3 | 7  | (6.93%)  | 7  | (6.93%)  |
| 4 | 14  | (13.86%)  | 12  | (11.88%)  |
| 5 | 15  | (14.85%) | 5  | (9.90%) |
| 6 | 11  | (10.89%)  | 9  | (8.91%)  |
| 7 | 15  | (14.85%)  | 13  | (12.87%)  |
| Total Risk neutral (3-7) | 61 | (61.39%) | 46  | (54.54%) |
| 8 | 9  | (8.91%)  | 16  | (15.84%)  |
| 9 | 5  | (4.95%)  | 15  | (14.85%)  |
| 10 | 5  | (4.95%)  | 8  | (7.92%)  |
| Total Risk takers (8-10) | 19 (18.81%) 39 (38.61%) |
| Scale: 0 shows complete unwillingness to take the risk, 10 indicates complete willingness to take the risk |

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**Table 4.6 Distribution of risk-aversion in comparison with other community members.**

|  |  |  |
| --- | --- | --- |
| Risk-taking  | R1: General  | R2: Animal management  |
|  | N | % | N | % |
| 1 | 20.00  | (19.80%)  | 18.00  | (17.82%) |
| 2 | 34.00  | (33.66%)  | 23.00  | (22.77%)  |
| 3 |  25.00  | (24.70%)  | 27.00  | (26.73%) |
| 4 | 17.00  | (16.83%)  | 27.00  | (26.73%) |
| 5 | 5.00  | (4.95 %) | 6.00 | (5.94%) |
| Total  | 101  | (100%) | 101 | (100%) |
| Scale: 1- I usually take much fewer risks than other members of my community, 5- I usually take much more risks than other members of my community |

*The author collected primary data*

**Table 4.7 Estimation results for the determinants of risk-aversion**

|  |  |
| --- | --- |
|  | **Dependent variable:**  |
| **Explanatory variables**  | **R1** | **R2**  |
| Age | -0.05\*\* | -0.06\*\* |
|  | (0.02) | (0.02) |
| Female | -0.70 | -1.03\* |
|  | (0.601) | (0.55) |
| Education | 0.15 | 0.24 |
|  | (0.34) | (0.31) |
| Income | -0.00 | -0.00 |
|  | (0.00) | (0.00) |
| Drought frequency | -0.07 | 0.31 |
|  | (0.27) | (0.24) |
| Weather forecast | 0.30 | 0.58 |
|  | (0.58) | (0.53) |
| Livestock sales | 0.11 | 0.06 |
|  | (0.13) | (0.13) |
| Herd size | 0.01 | 0.04 |
|  | (0.029) | (0.026) |
| Farming experience  | -0.08\* | -0.07\*\* |
|  | (0.04) | (0.04) |
| Arable land | 0.14 | 0.07 |
|  | (0.11) | (0.10) |
| Single | -0.16 | 0.30 |
|  | (0.80) | (0.74) |
| Constant | 7.94\*\*\* | 8.10\*\*\* |
|  | (2.06) | (1.89) |
| Observations | 101 | 101 |
| R2 | 0.19 | 0.32 |
| Adjusted R2 | 0.09 | 0.23 |
| Residual Std. Error (df = 89) | 2.73 | 2.50 |
| F Statistic (df = 11; 89) | 1.89\* | 3.78\*\*\* |
| Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01 |

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**Table 4.8 Implied loss aversion**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Lottery Task |  Acceptable loss | ω=1 α=1 β=1 | ω=0.864 α=1 β=1 | ω=1α=0.72 β=0.73 | ω=0.864 α=0.72 β=0.73 | Frequency  |
|  |  | λ1 | λ2 | λ3 | λ4 |  |
| 1.Reject All | <8 ZAR | >2.5 | >2.16 | >1,89 | >1,64 | 18 (16%) |
| 2.Accept\_L1, reject L2 to L6 | 8 ZAR | 2.50 | 2,16 | 1,89 | 1,64 | 15 (14%) |
| 3.Accept\_L2, reject L3 to L6 | 11 ZAR | 1.81 | 1,57 | 1,50 | 1,30 | 25 (23%) |
| 4.Accept\_L3, reject L3 to L6 | 14 ZAR | 1.43 | 1,24 | 1,26 | 1,09 | 30 (27%) |
| 5.Accept\_L4, reject L4 to L6 | 17 ZAR | 1.18 | 1,02 | 1,09 | 0,94 | 18 (16%) |
| 6.Accept\_L5, reject L6 | 20 ZAR | 1.00 | 0,86 | 0,97 | 0,84 | 4 (4.0%) |
| 7.Accept ALL  | 23 ZAR | ≤0.86 | ≤0,75 | ≤0,88 | ≤0,76 | 0 (0.0%) |
|  | Median  | 1.81 | 1.57 | 1.500 | 1.30 |  |
|  | Mean  | 1.762 | 1.53 | 1.45 | 1.26 |  |

*The author collected primary data*

**Table 4.9 Estimation results for the determinants of risk-aversion**

|  |  |
| --- | --- |
|  | Dependent variable:  |
|  | λ1 | λ2 | λ3 | λ4 |
|  |  |  |  |  |
| Age (in years) | 0.01\*\*\* | 0.01\*\*\* | 0.01\*\*\* | 0.01\*\*\* |
|  | (0.00) | (0.0) | (0.00) | (0.00) |
| Female | -0.02 | -0.01 | -0.01 | -0.01 |
|  | (0.10) | (0.090) | (0.055) | (0.063) |
| Education | 0.05 | 0.04 | 0.03 | 0.03 |
|  | (0.12) | (0.10) | (0.06) | (0.07) |
| Income | -0.00\* | -0.00\* | -0.00\* | -0.00\* |
|  | (0.00) | (0.00) | (0.00) | (0.00) |
| Drought frequency | 0.05 | 0.05 | 0.03 | 0.03 |
|  | (0.04) | (0.04) | (0.02) | (0.03) |
| Weather forecast | 0.04 | 0.03 | 0.02 | 0.03 |
|  | (0.10) | (0.09) | (0.05) | (0.06) |
| Livestock sales | -0.03 | -0.03 | -0.02 | -0.02 |
|  | (0.02) | (0.02) | (0.01) | (0.01) |
| Herd size | -0.00 | -0.00 | -0.00 | -0.00 |
|  | (0.01) | (0.00) | (0.00) | (0.00) |
| Single | 0.01 | 0.01 | 0.01 | -0.00 |
|  | (0.14) | (0.12) | (0.07) | (0.09) |
| Constant | 1.13\*\*\* | 0.98\*\*\* | 0.93\*\*\* | 1.06\*\*\* |
|  | (0.29) | (0.25) | (0.15) | (0.18) |
| Observations | 101 | 101 | 101 | 101 |
| R2 | 0.24 | 0.24 | 0.25 | 0.25 |
| Adjusted R2 | 0.17 | 0.17 | 0.17 | 0.18 |
| Residual Std. Error (df = 91) | 0.48 | 0.41 | 0.25 | 0.29 |
| F Statistic (df = 9; 91) | 3.23\*\*\* | 3.24\*\*\* | 3.29\*\*\* | 3.39\*\*\* |
| Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01 |

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**Table 4.10** **Conditional model estimates**

|  |  |  |
| --- | --- | --- |
|  | **Model 1**  | **Model 2**  |
| **Variables**  | **Coefficient** | **s.e.** | **Coefficient** | **s.e.** |
| ASC | -1.26\*\*\*  | 0.32 | 0.24 | 0.91 |
| Transparency | 0.33\*\*\*  | 0.09 | 0.33\*\*\*  | 0.09 |
| Reimburse method |  |  |  |  |
|  Voucher | 0.18  | 0.13 | 0.18  | 0.12 |
|  Feed  | 0.77\*\*\*  | 0.13 | 0.77\*\*\*  | 0.13 |
| Basis risk  | -0.46\*  | 0.28 | -0.52\*  | 0.29 |
| Basis Risk x Education  | 0.25\*  | 0.10 | 0.27\*\*  | 0.10 |
| Premium  | -0.21\*  | 0.09 | -0.22\*  | 0.09 |
| Premium x Education  | 0.01\*\*  | 0.04 | 0.10\*\*  | 0.04 |
| ASC x Size of arable land (hectares) | - | - | -0.26 \*\*  | 0.09 |
| ASC x Drought Frequency | - | - | -0.29 \*  | 0.14 |
| ASC x Loss aversion (λ4) | - | - | -0.13 | 0.32 |
| ASC x Trigger level 2  | - | - | -0.25 | 0.34 |
| ASC X Weather forecast | - | - | 0.13 | 0.32 |
| **Model statistics**  |  |  |  |  |
| AIC | 1049.21 |  | 670.09 |  |
| BIC  | 1084.47 |  | 615.92 |  |
| Rho-square  | 0.22 |  | 0.24 |  |
| Final log-likelihood | -516.61 |  | -509.19 |  |
| Number of individuals | 101 |  | 101 |  |
| **Signif. Codes: \*\*\*, \*\*, and \* indicate significance at 1%, 5%, and 10% level, where s.e stands for standard error.**  |

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**Table 4.11 The latent class model selection criteria**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Class 2** | **Class 3** | **Class 4** |
| AIC  | 1029.92 | 1024.60 | 1023.61 |
| BIC  | 1109.25 | 1156.80 | 1208.70 |
| LL  | -496.96 | -482.30 | -469.81 |
| Number of parameters | 18 | 30 | 42 |
| Sample Size  | 101 | 101 | 101 |

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**Table 4.12** **Latent class model estimates**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Class 1** | **Class 2** |
| **Variables**  | **Description**  | **Estimate** | **s.e.** | **Estimate** | **s.e.** |
| ASC | Non-insurance option=1, 0 otherwise  | -1.98\*\*\* | 0.43 | -1.98\*\*\*  | 0.43 |
| Transparency | Receive weekly index update=1, 0 other wise  | 0.86\*\*\* | 0.25 | -0.35\* | 0.18 |
| Reimburse method |  |  |  |  |  |
|  Voucher | Voucher as mode of reimbursement=1, 0 cash  | -0.13 | 0.145 | 0.27\*\* | 0.18 |
|  Feed  | Feed as mode of reimbursement=1, 0 cash  | 0.64\*\*\*  | 0.22 | 1.10\*\*\*  | 0.28 |
| Basis risk  | Risk of receiving lower reimbursement  | 0.59\*\* | 0.27 | -0.57\* | 0.30 |
| Premium  | Premium to be paid  | 0.16\*\* | 0.08 | -0.30\*\*\*  | 0.09 |
| **Class membership probability model** |
| Livestock sales  | Animals sold the previous year | -0.26\* | 0.13 | - | - |
| Size of arable land  | Size of arable land (in hectares) | 0.17 | 0.18 | - | - |
| Weather forecast  | Receive weather forecast=1, 0 otherwise | 0.91 | 0.55 | - | - |
| Young farmers  | Respondents that are at most 50 years old | 1.08 | 0.69 | - | - |
| Drought Frequency  | Frequency in past five years  | -0.17  | 0.24 | - | - |
| Loss Aversion | Loss-aversion (accounting PW and DS) | 0.72 | 0.85 | - | - |
| **Model statistics** |  |
|  |  |  |  |  |  |
| Segment probability  | Probability of individual belonging to segment  | 0.53 |  | 0.47 |  |
| AIC | Akaike Information Criterion  | 1029.89 |  | - |  |
| BIC  | Bayesian Information Criterion  | 1109.21 |  | - |  |
| Rho-square  | McFadden Pseudo R square  | 0.2536 |  | - |  |
| LL (0, whole model)  | log-likelihood | -665.76 |  | - |  |
| LL (final, whole model) | Final log-likelihood | -496.94 |  | - |  |
| Number of respondents in the model | 101 |  |  |  |
| **Signif. Codes: \*\*\*, \*\*, and \* indicate significance at 1%, 5%, and 10% level, where s.e standards for standard error.**  |

*The author collected primary data*

**Table 4.13** **WTP estimates from CL model without interaction.**

|  |  |  |
| --- | --- | --- |
|  | Value (ZAR) | Confidence Interval  |
| Transparency  | 155.50 | [-16.63, 327.66] |
| Voucher  | 86.62 | [-61.94, 235.17] |
|  Feed | 362.60 | [0.92,724.31] |
| Basis Risk  | -220.10 | [-498.05 57.76] |

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**Table 4.14** **The WTP estimates from latent class model-Class 2**

|  |  |  |
| --- | --- | --- |
|  | Value (ZAR) | Confidence Interval |
| Transparency  | -116.40 | [-230.14 -2.70] |
| Voucher  | 91.56 | [-17.91 ,201.03] |
|  Feed | 364.60 | [105.88, 623.37] |
| Basis Risk  | -188.90 | [-392.28, 14.57] |

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