CEs are theoretically grounded in Lancaster's theory of value (Lancaster, 1966) and based on Random Utility Theory (Luce, 2005; McFadden, 1973). For a general description of CEs, see (Holmes et al., 2017). We used a RPL model for choice data analysis which takes into account heterogeneity of the parameter values among respondents and relaxes key assumptions which constrain the use of conditional logit models, namely independence of irrelevant alternatives - *iid* (Hensher et al., 2005). Under a RPL specification, the utility a respondent *i* derives from an alternative *j* in each choice situation *t* is given by:

|  |  |  |
| --- | --- | --- |
|  |  | ( 1) |

Where *Uijt*is a utility maximising individual, *Xijt* is a vector of observed attributes associated with each contract option (i.e. contract length, scheme support, structure of scheme and price) plus the socio-economic characteristics of respondents and εijt is the random component of the utility that is assumed to have an *iid* value distribution.

In the RPL model, conditional on the individual specific parameters βi and error components εi the probability that individual *i* chooses alternative *j* in a particular choice task *n* is represented as:

|  |  |  |
| --- | --- | --- |
|  |  | ( 2) |
|  |  |  |

Note, choices for bovine and ovine farmers were modelled separately to explore preference heterogeneity between both groups. The unconditional choice probability is the expected value of the logit probability over all possible values of β weighted by the density of β. The marginal probability of choice can be derived from integrating the distribution functions for the random parameters β. The probability of choosing alternative *j* over *N* observed choices is:

|  |  |  |
| --- | --- | --- |
|  |  | ( 3) |
|  |  |  |

Where *f (β|θ)* is the density function for *β* with a mean *b* and covariance *W*. This equation does not have a closed form and so we rely on simulation methods (for details see Train (2009)). Draws of values of are drawn from for r=1,…, R. The probabilities are approximated by drawing the values from the density function and averaged to estimate the simulated probability. Random parameters were estimated using 1000 Halton draws which take into account the heterogeneity of parameter values sampled from the distribution of respondent’s choice (Greiner, 2015; Mariel et al., 2013). A normal distribution is assigned to the random parameters to allow respondents to have either positive or negative marginal utility for the contract attributes (Christie et al., 2015). The simulated probabilities based on R draws are inserted into the log likelihood function to give a simulated log likelihood function:

|  |  |  |
| --- | --- | --- |
|  |  | ( 4) |

Where *dnj* = 1 if *n* chose alternative *j*, zero otherwise (Train, 2002). In a CE, the standard approach to calculate respondent WTA is to is to compute . Depending on the choice of the parameter distributions, this may lead to skewed WTA distribution. Train and Weeks (2005) suggest this estimation can be improved by estimating the RPL in WTA space. cost was therefore calculated by estimating the RPL model in WTA space rather than in preference space, as suggested by Akaichi et al., (2016). This involves estimating the distribution of WTA directly and is denoted by:

|  |  |  |
| --- | --- | --- |
|  |  | ( 5) |

where *SQ* represents the status quo (non-enrolment option); *CL* (contract length); *SS* (scheme support); *SOS* (structure of scheme) and *COS* (subsidy) and represents a random error term. Individual specific parameters (Table 2) for individual *i* were dummy coded and interacted with random parameters to determine policy relevant factors influencing contract preferences. Contract probabilities of enrolment were calculated under alternative payment scenarios to determine how probability of uptake varied according to contract attributes and payment rates, following a similar method to (Adams et al., 2014). Based on the CE, the probability of an individual *i* choosing a contract alternative *j* is given by:

|  |  |  |
| --- | --- | --- |
|  |  | ( 6) |

whereby alternative specific variables (i.e. contract options) for individual *i* and alternative *j* are given by whilst coefficients are denoted by γ. Case specific variables for individual *i* are given by *xi* whilst coefficients are denoted by β. We estimated the probability of participation for case specific contracts under two scenarios– ‘optimal’ and ‘non-optimal’ contracts. ‘Optimal’ refers to contract attributes (excluding subsidy) that meet the preferences of agents while ‘non-optimal’ contracts do not. This was relative to a non-enrolment option. The empirical model was estimated using the econometric software NLOGIT 5.0.