

Calibration Weighting for the Farm Business Survey (FBS) in England

The weighting of the FBS results is a two stage process with firstly an initial weight (design weight) being produced and then this initial weight being adjusted via a calibration procedure. The weights are based on population data from the June business register and are calculated for each design stratum. The Initial weights (design weights) for the FBS are based on the inverse sampling fraction. These weights are then adjusted (Calibration Weighting) so that they produce correct population totals for a series of calibration variables for which accurate population values are known from other sources. This ensures that the weights produce precise estimates of other variables, with little bias, despite the inevitable imperfections of the sampling strategy.

The remainder of this document sets out the weighting model used

The Weighting Model

The initial (design) weights are based on the inverse sampling fraction for each design stratum (farm type by farm size). For example if there were 250 small cereal farms in the population and of these 50 were sampled for the FBS then the initial weight for these 50 farms would be 5 (250/50).

These initial weights are then adjusted (calibration) so that they can reproduce estimates of a number of different target variables (constraints). The initial weights are adjusted so that the distance between the design weights and the calibrated weights are minimised:

$$\min_{\{w_k\}_{(k \in s)}} \sum d(w_k, d_k)$$

Under constraints

$$\sum_s w_k x_k^{(1)} = t_{x^{(1)}}$$

K

$$\sum_s w_k x_k^{(p)} = t_{x^{(p)}}$$

Where:

k – units in the population of size N

s - sample of units from population of size n

d_k – design weight

w_k – calibrated weight

x_k - vector of auxiliary variables of interest

t_{x^(1...p)} – totals of the population auxiliary variables of interest, calculated from administrative data or from the June Survey.

The constraints used in the FBS are as follows:

- The number of farms in the population
- The number of farms in the population by farm type
- The number of farms in the population by farm size
- Volume of milk produced in England
- Area of Wheat in England

- Area of Barley in England
- Area of Oil Seed Rape in England
- Total Area
- Full Agricultural Tenancy Area
- Other Rented area (Farm Business Tenancy)
- Number of Dairy Cows
- Number of Beef Breed herd
- Number of Breeding Ewes
- Number of Breeding Pigs
- Basic Payment Scheme moorland area
- SDA area less moorland
- All non-SDA activated entitlements
- Area organic or in conversion
- Number of laying birds
- Number of meat birds

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