We relied on an ordinal probit regression. More specifically, we assume that

if

where are the break points that need to be estimated. We assume that the latent is given by:

where is a vector of probabilities that sum to one. For priors, we assume that

where T is a diagonal matrix.

Finally, we assume that for identifiability purposes. Furthermore, instead of directly modeling the breakpoints , we model the increments in breakpoints. In other words, we assume that , where we assume that:

#-----------------------------------------------

FCD’s

* For

We determine the FCD for by first integrating over the latent :

Because we do not have a conjugate pair, we rely on a Metropolis-Hasting algorithm in which we propose using the following Dirichlet distribution

Notice that . As the scalar parameter increases, the variance increases for

* For

As a result, we have that:

* For
* For breakpoints increments

Again, the expression above is obtained after we integrate out the latent variables . We sample breakpoints using a Metropolis-Hastings algorithm. Within this algorithm, we proposed new values using a normal distribution reflected at zero, ensuring that is always positive and that the ratio of the proposal distributions is always equal to one.