

# Another approach

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So far, I have not been able to really find a good approach that works consistently. There appears to be some challenges when trying to estimate  $\alpha$  using the pairwise likelihood. Based on some of my previous research, it would appear that the pairwise likelihood does a reasonably good job estimating the bandwidth term  $\rho$ . Brian and I had originally discussed fixing both  $\rho$  and  $\alpha$  in the simulation study, because when they're fixed, we can outperform spatial probit and logit. The purpose of this document is to explore what happens when we search over a grid of  $\rho$  terms and fix rho in the MCMC to  $\arg \min_{\rho} \ell$ .

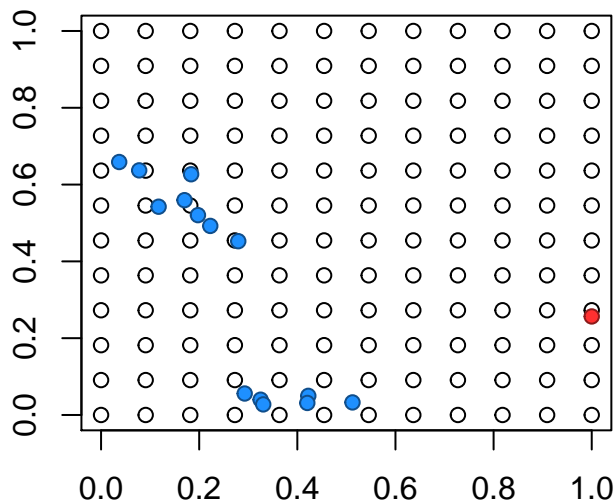
## Setting 1:

$$\alpha = 0.2, \pi = 0.05, \rho = 0.15$$

## Dataset 1

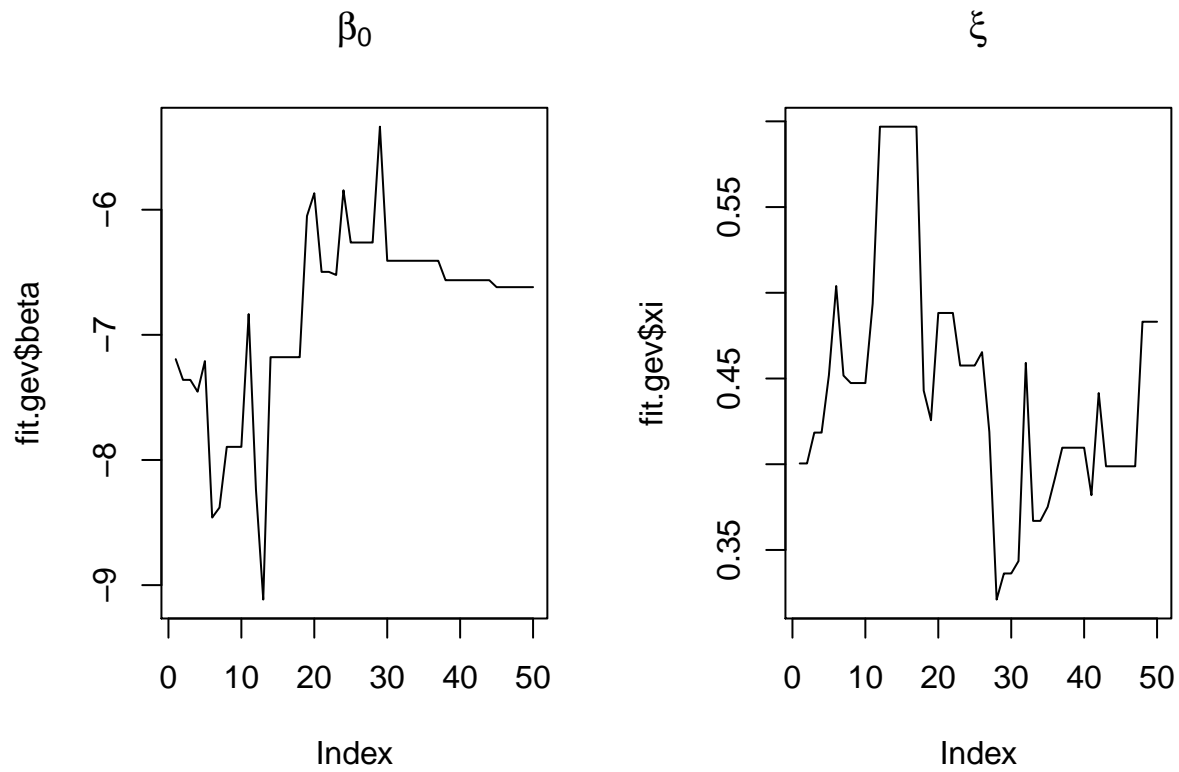
From the pairwise likelihood, we'll be using  $\rho = 0.1071$ .

## simulated dataset



## MCMC Results

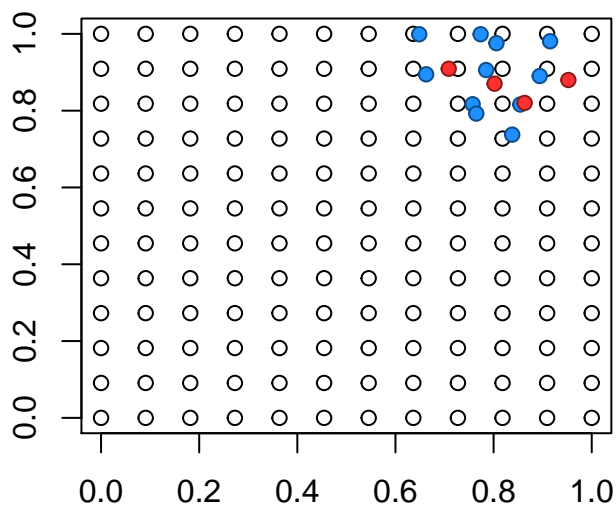
Here are the iteration plots from the two GEV models. The true values are  $\beta_0 = -4.772$ , and  $\xi = 0.25$ .



## Dataset 2

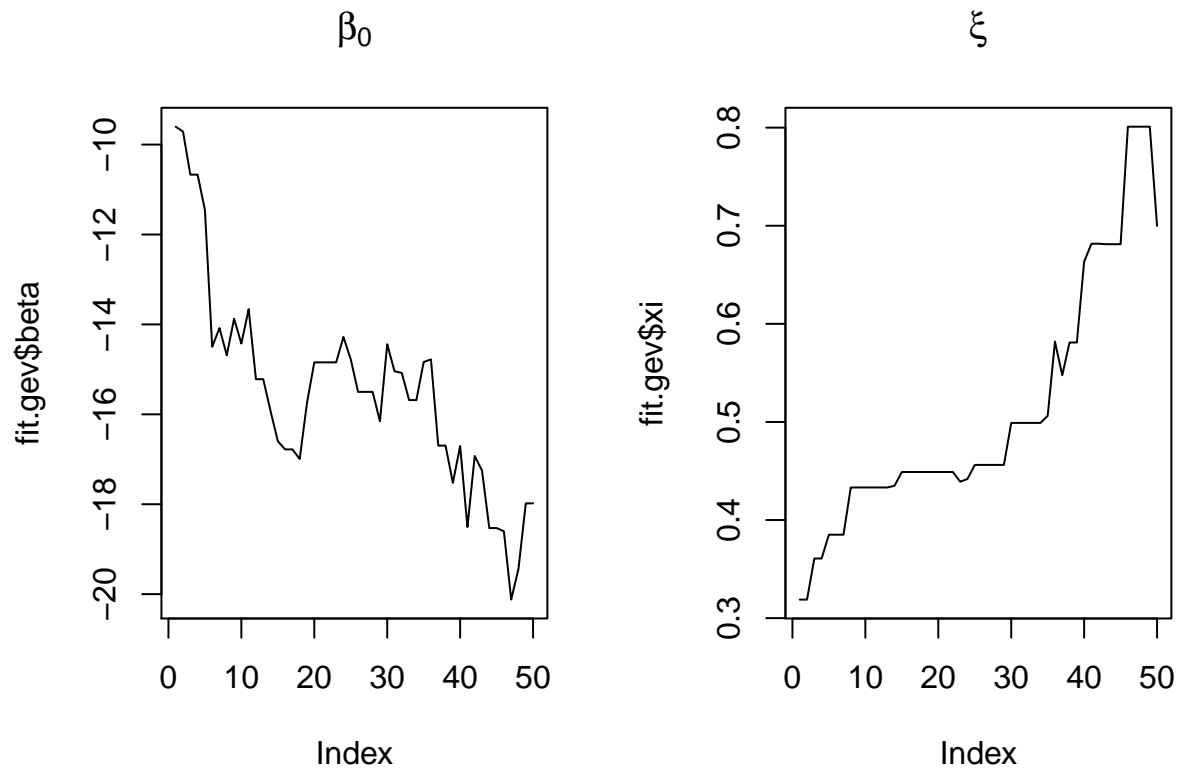
From the pairwise likelihood, we'll be using  $\rho = 0.1071$ .

## simulated dataset



## MCMC Results

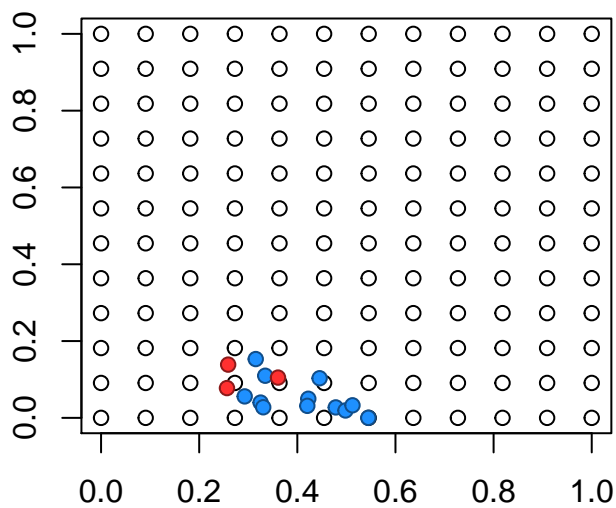
Here are the iteration plots from the two GEV models. The true values are  $\beta_0 = -7.598$ , and  $\xi = 0.25$ .



### Dataset 3

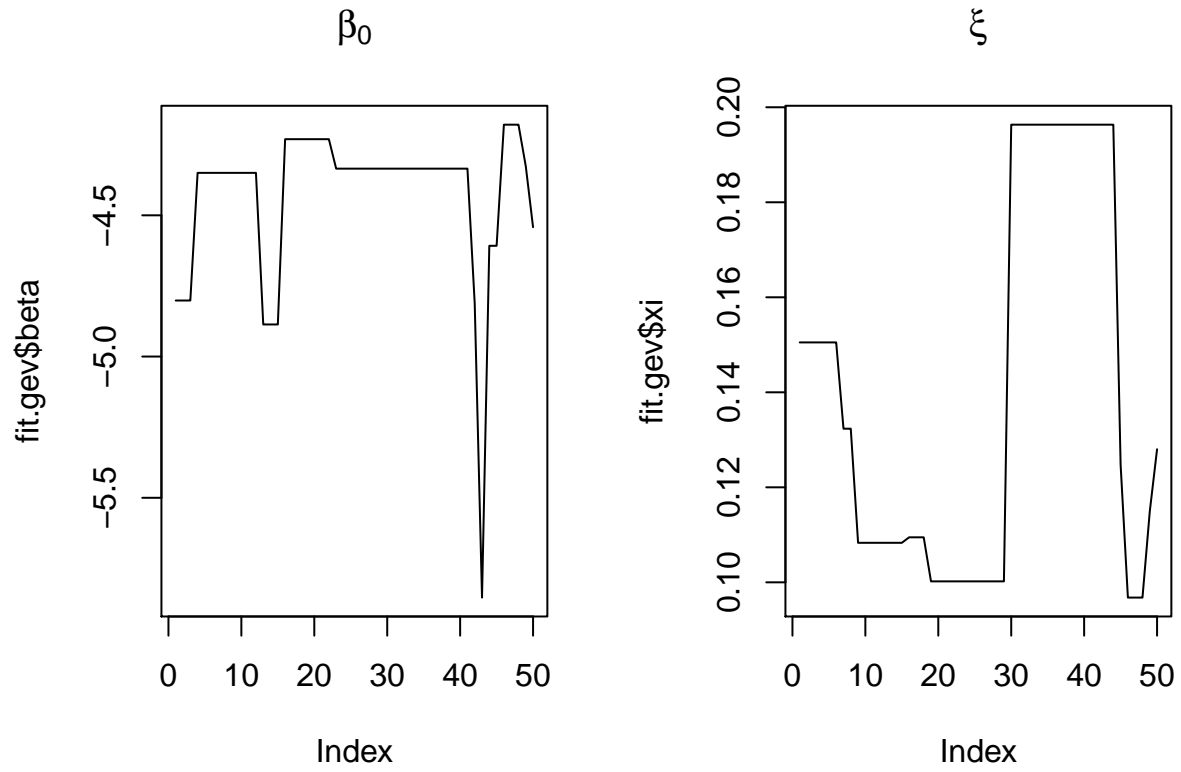
From the pairwise likelihood, we'll be using  $\rho = 0.1071$ .

### simulated dataset



### MCMC Results

Here are the iteration plots from the two GEV models. The true values are  $\beta_0 = -11.634$ , and  $\xi = 0.25$ .



## Brier Scores

The brier scores are

Logit 1-1: 0.1207

Probit 1-1: 0.0121

GEV 1-1: 0.012

The brier scores are

Logit 2-1: 0.1207

Probit 2-1: 0.0121

GEV 2-1: 0.012

The brier scores are

Logit 3-1: 0.1207

Probit 3-1: 0.0121

GEV 3-1: 0.012

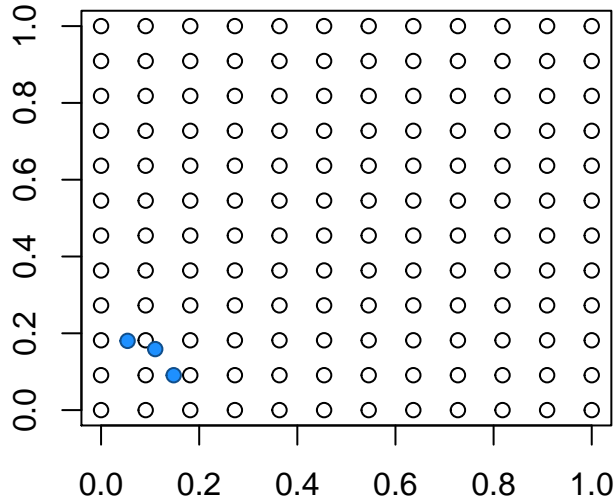
## Setting 2:

$\alpha = 0.2, \pi = 0.01, \rho = 0.15$

## Dataset 1

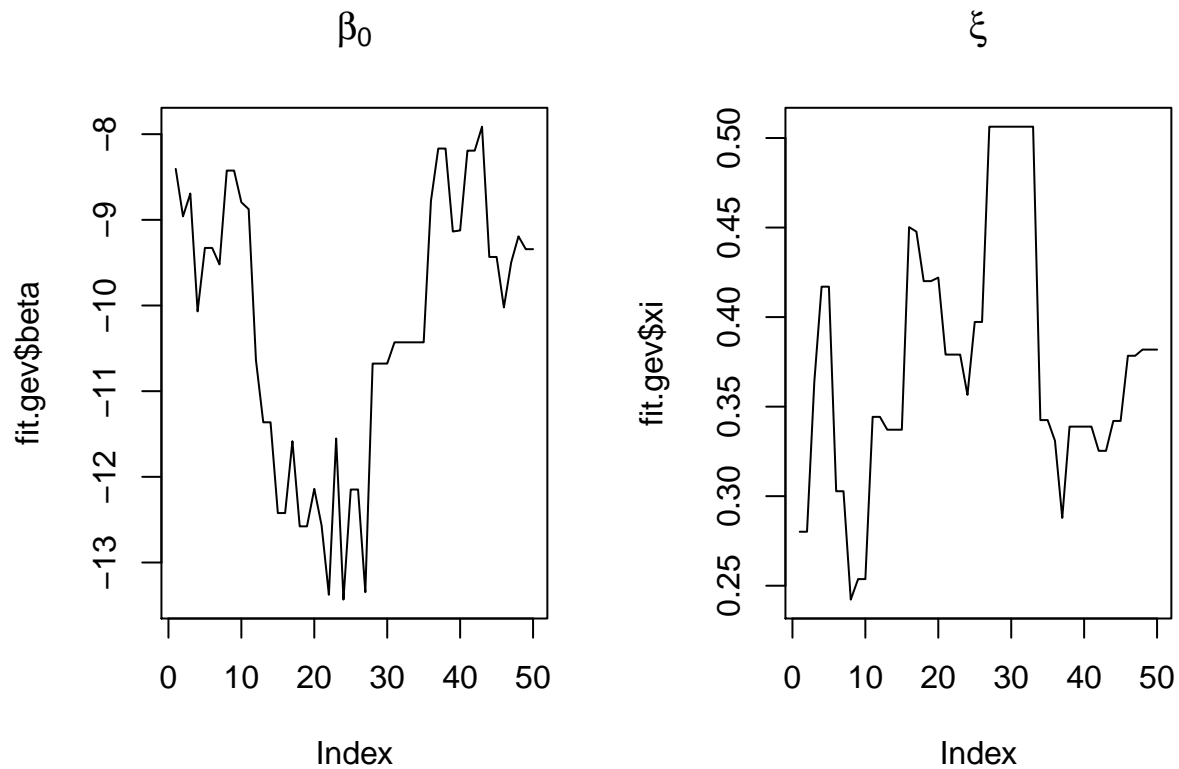
From the pairwise likelihood, we'll be using  $\rho = 0.1071$ .

### simulated dataset



## MCMC Results

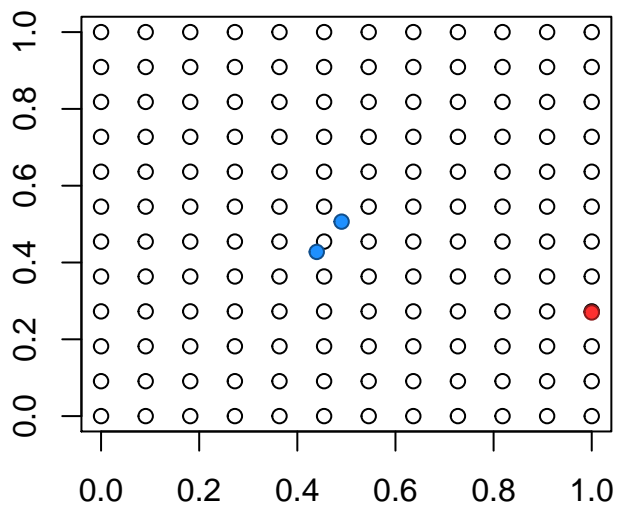
Here are the iteration plots from the two GEV models. The true values are  $\beta_0 = -4.168$ , and  $\xi = 0.25$ .



## Dataset 2

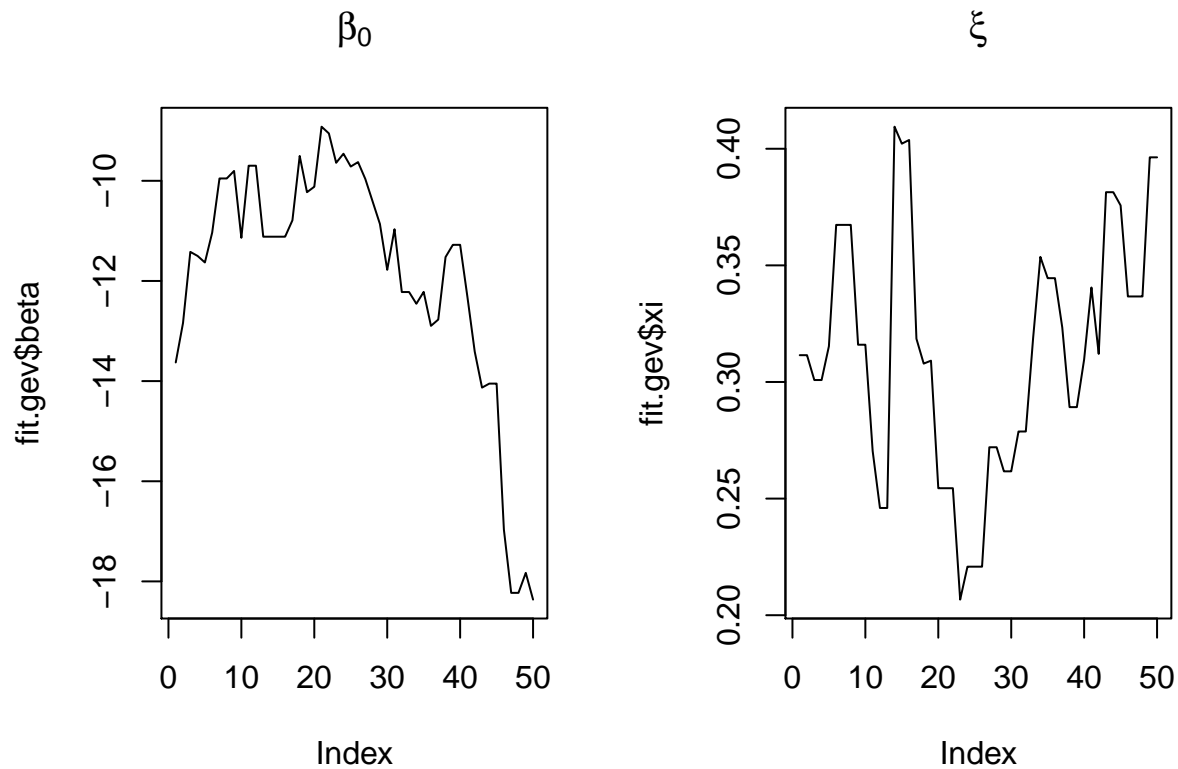
From the pairwise likelihood, we'll be using  $\rho = 0.1071$ .

### simulated dataset



## MCMC Results

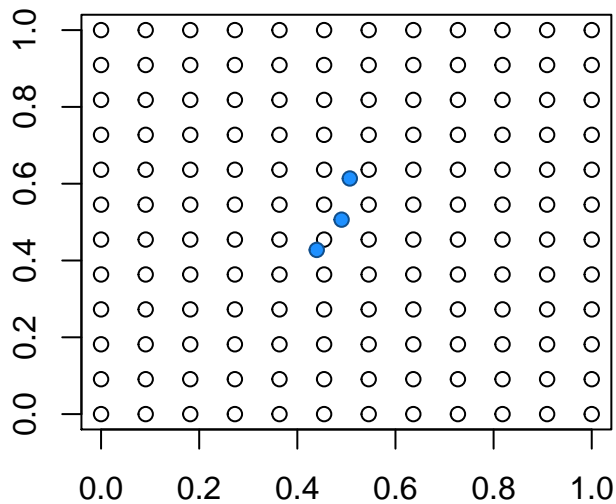
Here are the iteration plots from the two GEV models. The true values are  $\beta_0 = -3.138$ , and  $\xi = 0.25$ .



### Dataset 3

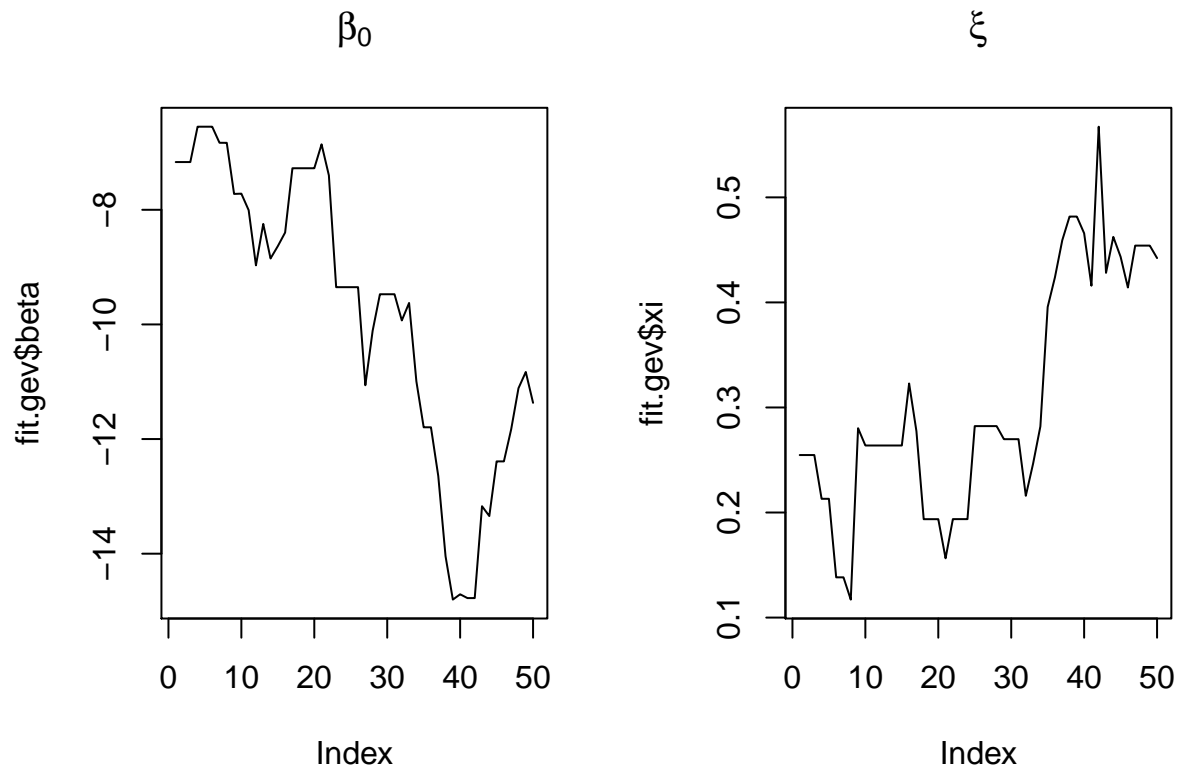
From the pairwise likelihood, we'll be using  $\rho = 0.1071$ .

#### simulated dataset



### MCMC Results

Here are the iteration plots from the two GEV models. The true values are  $\beta_0 = -4.167$ , and  $\xi = 0.25$ .



## **Brier Scores**

The brier scores are

Logit 1-2: 106.99

Probit 1-2: 0.45

GEV 1-2: 0.04

The brier scores are

Logit 2-2: 106.99

Probit 2-2: 0.45

GEV 2-2: 0.04

The brier scores are

Logit 3-2: 106.99

Probit 3-2: 0.45

GEV 3-2: 0.04