

```

# Load the lars package and the diabetes dataset
library(reshape2)
library(lars)

## Loaded lars 1.3

data(diabetes)
library(GGally)

## Loading required package: ggplot2

## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg      ggplot2

library(ggplot2)
library(gridExtra)

library("rstan") # observe startup messages

## Loading required package: StanHeaders

##
## rstan version 2.32.3 (Stan version 2.26.1)

## For execution on a local, multicore CPU with excess RAM we recommend calling
## options(mc.cores = parallel::detectCores()).
## To avoid recompilation of unchanged Stan programs, we recommend calling
## rstan_options(auto_write = TRUE)
## For within-chain threading using `reduce_sum()` or `map_rect()` Stan functions,
## change `threads_per_chain` option:
## rstan_options(threads_per_chain = 1)

options(mc.cores = parallel::detectCores())
rstan_options(auto_write = TRUE)
#data
X_matrix <- diabetes$x
class(X_matrix) <- "matrix"
y_vector <- diabetes$y

X_design <- cbind(1, X_matrix)

data_list <- list(
  N = dim(X_design)[1],
  K = dim(X_design)[2],
  x = X_design,
  y = y_vector
)

model_hier <- stan_model(file='./prior_M2_hier.stan')

## hash mismatch so recompiling; make sure Stan code ends with a blank line
# Create a data list for Stan
set.seed(123)

# Fit the model to the data

```

```
stan_fit_hier <- sampling(model_hier,
  data = data_list,
  chains = 4,
  iter = 5000)
```

```
## Warning: There were 2912 divergent transitions after warmup. See
## https://mc-stan.org/misc/warnings.html#divergent-transitions-after-warmup
## to find out why this is a problem and how to eliminate them.
```

```
## Warning: Examine the pairs() plot to diagnose sampling problems
```

```
## Warning: Tail Effective Samples Size (ESS) is too low, indicating posterior variances and tail quantiles
## Running the chains for more iterations may help. See
## https://mc-stan.org/misc/warnings.html#tail-ess
```

```
# Print a summary of the results
print(stan_fit_hier)
```

```
## Inference for Stan model: anon_model.
```

```
## 4 chains, each with iter=5000; warmup=2500; thin=1;
```

```
## post-warmup draws per chain=2500, total post-warmup draws=10000.
```

```
##
```

|                | mean    | se_mean | sd     | 2.5%     | 25%      | 50%     | 75%     |
|----------------|---------|---------|--------|----------|----------|---------|---------|
| ## beta[1]     | 152.17  | 0.08    | 2.65   | 146.93   | 150.45   | 152.16  | 153.86  |
| ## beta[2]     | -7.58   | 0.99    | 58.38  | -124.36  | -45.95   | -6.33   | 30.61   |
| ## beta[3]     | -239.65 | 1.33    | 61.97  | -357.80  | -279.50  | -239.54 | -198.92 |
| ## beta[4]     | 520.24  | 1.16    | 67.35  | 388.56   | 473.82   | 520.48  | 566.01  |
| ## beta[5]     | 323.58  | 1.03    | 66.05  | 191.74   | 279.24   | 322.31  | 368.98  |
| ## beta[6]     | -802.63 | 13.66   | 427.73 | -1654.91 | -1088.66 | -807.79 | -515.97 |
| ## beta[7]     | 485.52  | 11.28   | 349.04 | -196.39  | 253.62   | 486.05  | 712.62  |
| ## beta[8]     | 103.65  | 6.55    | 217.21 | -330.04  | -39.04   | 105.76  | 250.26  |
| ## beta[9]     | 175.68  | 3.17    | 161.11 | -148.58  | 71.32    | 176.17  | 286.40  |
| ## beta[10]    | 756.16  | 5.06    | 173.59 | 413.44   | 640.63   | 754.82  | 874.80  |
| ## beta[11]    | 66.64   | 1.44    | 66.77  | -59.80   | 21.36    | 66.90   | 112.38  |
| ## sigma2      | 2943.88 | 3.91    | 203.71 | 2573.60  | 2801.74  | 2931.99 | 3070.55 |
| ## mu_beta[1]  | 152.28  | 1.00    | 54.54  | 46.13    | 117.41   | 151.15  | 188.94  |
| ## mu_beta[2]  | -6.94   | 1.39    | 79.26  | -163.87  | -60.06   | -5.58   | 45.75   |
| ## mu_beta[3]  | -238.71 | 1.45    | 81.30  | -394.50  | -293.53  | -239.70 | -184.92 |
| ## mu_beta[4]  | 520.90  | 1.48    | 86.23  | 351.70   | 461.87   | 522.16  | 578.82  |
| ## mu_beta[5]  | 322.82  | 1.41    | 85.76  | 155.82   | 265.86   | 323.02  | 379.58  |
| ## mu_beta[6]  | -804.22 | 13.85   | 432.04 | -1675.50 | -1090.59 | -808.00 | -514.71 |
| ## mu_beta[7]  | 485.47  | 11.03   | 352.98 | -202.54  | 249.80   | 485.20  | 718.20  |
| ## mu_beta[8]  | 104.57  | 6.86    | 223.30 | -340.10  | -47.41   | 107.29  | 255.63  |
| ## mu_beta[9]  | 175.24  | 3.23    | 169.44 | -160.84  | 63.94    | 175.04  | 289.33  |
| ## mu_beta[10] | 756.97  | 5.06    | 181.96 | 397.50   | 634.68   | 756.10  | 882.72  |
| ## mu_beta[11] | 67.98   | 1.49    | 84.99  | -98.21   | 10.24    | 68.40   | 125.42  |
| ## CO[1,1]     | 1.00    | NaN     | 0.00   | 1.00     | 1.00     | 1.00    | 1.00    |
| ## CO[1,2]     | 0.00    | 0.01    | 0.29   | -0.56    | -0.21    | 0.00    | 0.22    |
| ## CO[1,3]     | 0.01    | 0.00    | 0.29   | -0.55    | -0.20    | 0.01    | 0.21    |
| ## CO[1,4]     | 0.00    | 0.00    | 0.29   | -0.54    | -0.20    | 0.00    | 0.21    |
| ## CO[1,5]     | 0.00    | 0.00    | 0.29   | -0.55    | -0.22    | -0.01   | 0.20    |
| ## CO[1,6]     | 0.00    | 0.00    | 0.28   | -0.54    | -0.19    | 0.01    | 0.21    |
| ## CO[1,7]     | 0.00    | 0.00    | 0.29   | -0.56    | -0.21    | 0.00    | 0.21    |
| ## CO[1,8]     | 0.01    | 0.00    | 0.28   | -0.53    | -0.18    | 0.01    | 0.21    |
| ## CO[1,9]     | -0.01   | 0.00    | 0.29   | -0.55    | -0.21    | -0.01   | 0.20    |
| ## CO[1,10]    | 0.00    | 0.00    | 0.29   | -0.55    | -0.21    | 0.00    | 0.21    |

|             |       |      |      |       |       |       |      |
|-------------|-------|------|------|-------|-------|-------|------|
| ## C0[1,11] | 0.00  | 0.01 | 0.30 | -0.57 | -0.21 | 0.01  | 0.22 |
| ## C0[2,1]  | 0.00  | 0.01 | 0.29 | -0.56 | -0.21 | 0.00  | 0.22 |
| ## C0[2,2]  | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[2,3]  | -0.01 | 0.01 | 0.29 | -0.54 | -0.22 | -0.01 | 0.20 |
| ## C0[2,4]  | 0.00  | 0.01 | 0.29 | -0.54 | -0.21 | 0.00  | 0.21 |
| ## C0[2,5]  | 0.00  | 0.00 | 0.29 | -0.56 | -0.21 | -0.01 | 0.21 |
| ## C0[2,6]  | 0.02  | 0.01 | 0.30 | -0.55 | -0.19 | 0.01  | 0.22 |
| ## C0[2,7]  | 0.00  | 0.00 | 0.28 | -0.55 | -0.20 | 0.01  | 0.19 |
| ## C0[2,8]  | -0.01 | 0.01 | 0.30 | -0.60 | -0.22 | 0.00  | 0.20 |
| ## C0[2,9]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |
| ## C0[2,10] | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | 0.00  | 0.21 |
| ## C0[2,11] | 0.00  | 0.01 | 0.29 | -0.57 | -0.20 | 0.00  | 0.21 |
| ## C0[3,1]  | 0.01  | 0.00 | 0.29 | -0.55 | -0.20 | 0.01  | 0.21 |
| ## C0[3,2]  | -0.01 | 0.01 | 0.29 | -0.54 | -0.22 | -0.01 | 0.20 |
| ## C0[3,3]  | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[3,4]  | -0.01 | 0.01 | 0.29 | -0.57 | -0.21 | -0.01 | 0.20 |
| ## C0[3,5]  | 0.00  | 0.01 | 0.30 | -0.55 | -0.22 | 0.00  | 0.21 |
| ## C0[3,6]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.22 | 0.00  | 0.20 |
| ## C0[3,7]  | 0.01  | 0.00 | 0.28 | -0.53 | -0.19 | 0.00  | 0.20 |
| ## C0[3,8]  | 0.01  | 0.01 | 0.29 | -0.55 | -0.20 | 0.02  | 0.22 |
| ## C0[3,9]  | 0.00  | 0.01 | 0.29 | -0.56 | -0.21 | 0.01  | 0.21 |
| ## C0[3,10] | 0.00  | 0.00 | 0.29 | -0.56 | -0.22 | 0.00  | 0.21 |
| ## C0[3,11] | -0.01 | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |
| ## C0[4,1]  | 0.00  | 0.00 | 0.29 | -0.54 | -0.20 | 0.00  | 0.21 |
| ## C0[4,2]  | 0.00  | 0.01 | 0.29 | -0.54 | -0.21 | 0.00  | 0.21 |
| ## C0[4,3]  | -0.01 | 0.01 | 0.29 | -0.57 | -0.21 | -0.01 | 0.20 |
| ## C0[4,4]  | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[4,5]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.22 | -0.01 | 0.20 |
| ## C0[4,6]  | 0.01  | 0.01 | 0.30 | -0.58 | -0.21 | 0.01  | 0.21 |
| ## C0[4,7]  | 0.01  | 0.01 | 0.29 | -0.55 | -0.20 | -0.01 | 0.22 |
| ## C0[4,8]  | -0.01 | 0.00 | 0.29 | -0.56 | -0.22 | -0.01 | 0.20 |
| ## C0[4,9]  | 0.00  | 0.00 | 0.29 | -0.55 | -0.20 | 0.00  | 0.20 |
| ## C0[4,10] | 0.00  | 0.01 | 0.29 | -0.56 | -0.21 | -0.01 | 0.21 |
| ## C0[4,11] | 0.00  | 0.00 | 0.29 | -0.56 | -0.21 | 0.00  | 0.21 |
| ## C0[5,1]  | 0.00  | 0.00 | 0.29 | -0.55 | -0.22 | -0.01 | 0.20 |
| ## C0[5,2]  | 0.00  | 0.00 | 0.29 | -0.56 | -0.21 | -0.01 | 0.21 |
| ## C0[5,3]  | 0.00  | 0.01 | 0.30 | -0.55 | -0.22 | 0.00  | 0.21 |
| ## C0[5,4]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.22 | -0.01 | 0.20 |
| ## C0[5,5]  | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[5,6]  | 0.00  | 0.00 | 0.28 | -0.55 | -0.20 | 0.00  | 0.21 |
| ## C0[5,7]  | -0.01 | 0.01 | 0.29 | -0.56 | -0.21 | -0.01 | 0.19 |
| ## C0[5,8]  | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | 0.00  | 0.20 |
| ## C0[5,9]  | -0.01 | 0.01 | 0.29 | -0.58 | -0.22 | -0.01 | 0.20 |
| ## C0[5,10] | 0.00  | 0.00 | 0.28 | -0.54 | -0.21 | -0.01 | 0.20 |
| ## C0[5,11] | 0.00  | 0.00 | 0.29 | -0.57 | -0.20 | 0.00  | 0.20 |
| ## C0[6,1]  | 0.00  | 0.00 | 0.28 | -0.54 | -0.19 | 0.01  | 0.21 |
| ## C0[6,2]  | 0.02  | 0.01 | 0.30 | -0.55 | -0.19 | 0.01  | 0.22 |
| ## C0[6,3]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.22 | 0.00  | 0.20 |
| ## C0[6,4]  | 0.01  | 0.01 | 0.30 | -0.58 | -0.21 | 0.01  | 0.21 |
| ## C0[6,5]  | 0.00  | 0.00 | 0.28 | -0.55 | -0.20 | 0.00  | 0.21 |
| ## C0[6,6]  | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[6,7]  | 0.01  | 0.01 | 0.29 | -0.54 | -0.19 | 0.01  | 0.21 |
| ## C0[6,8]  | -0.01 | 0.01 | 0.30 | -0.59 | -0.22 | 0.00  | 0.21 |
| ## C0[6,9]  | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |

|              |       |      |      |       |       |       |      |
|--------------|-------|------|------|-------|-------|-------|------|
| ## C0[6,10]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.20 | -0.01 | 0.20 |
| ## C0[6,11]  | -0.01 | 0.01 | 0.30 | -0.60 | -0.21 | 0.00  | 0.20 |
| ## C0[7,1]   | 0.00  | 0.00 | 0.29 | -0.56 | -0.21 | 0.00  | 0.21 |
| ## C0[7,2]   | 0.00  | 0.00 | 0.28 | -0.55 | -0.20 | 0.01  | 0.19 |
| ## C0[7,3]   | 0.01  | 0.00 | 0.28 | -0.53 | -0.19 | 0.00  | 0.20 |
| ## C0[7,4]   | 0.01  | 0.01 | 0.29 | -0.55 | -0.20 | -0.01 | 0.22 |
| ## C0[7,5]   | -0.01 | 0.01 | 0.29 | -0.56 | -0.21 | -0.01 | 0.19 |
| ## C0[7,6]   | 0.01  | 0.01 | 0.29 | -0.54 | -0.19 | 0.01  | 0.21 |
| ## C0[7,7]   | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[7,8]   | 0.00  | 0.01 | 0.29 | -0.54 | -0.20 | 0.00  | 0.21 |
| ## C0[7,9]   | 0.01  | 0.01 | 0.29 | -0.56 | -0.20 | 0.01  | 0.22 |
| ## C0[7,10]  | 0.01  | 0.00 | 0.29 | -0.54 | -0.19 | 0.01  | 0.21 |
| ## C0[7,11]  | -0.01 | 0.00 | 0.29 | -0.56 | -0.21 | -0.01 | 0.20 |
| ## C0[8,1]   | 0.01  | 0.00 | 0.28 | -0.53 | -0.18 | 0.01  | 0.21 |
| ## C0[8,2]   | -0.01 | 0.01 | 0.30 | -0.60 | -0.22 | 0.00  | 0.20 |
| ## C0[8,3]   | 0.01  | 0.01 | 0.29 | -0.55 | -0.20 | 0.02  | 0.22 |
| ## C0[8,4]   | -0.01 | 0.00 | 0.29 | -0.56 | -0.22 | -0.01 | 0.20 |
| ## C0[8,5]   | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | 0.00  | 0.20 |
| ## C0[8,6]   | -0.01 | 0.01 | 0.30 | -0.59 | -0.22 | 0.00  | 0.21 |
| ## C0[8,7]   | 0.00  | 0.01 | 0.29 | -0.54 | -0.20 | 0.00  | 0.21 |
| ## C0[8,8]   | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[8,9]   | 0.00  | 0.00 | 0.29 | -0.54 | -0.21 | -0.01 | 0.20 |
| ## C0[8,10]  | 0.00  | 0.01 | 0.29 | -0.53 | -0.20 | 0.00  | 0.21 |
| ## C0[8,11]  | 0.00  | 0.01 | 0.29 | -0.56 | -0.20 | 0.01  | 0.22 |
| ## C0[9,1]   | -0.01 | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |
| ## C0[9,2]   | -0.01 | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |
| ## C0[9,3]   | 0.00  | 0.01 | 0.29 | -0.56 | -0.21 | 0.01  | 0.21 |
| ## C0[9,4]   | 0.00  | 0.00 | 0.29 | -0.55 | -0.20 | 0.00  | 0.20 |
| ## C0[9,5]   | -0.01 | 0.01 | 0.29 | -0.58 | -0.22 | -0.01 | 0.20 |
| ## C0[9,6]   | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |
| ## C0[9,7]   | 0.01  | 0.01 | 0.29 | -0.56 | -0.20 | 0.01  | 0.22 |
| ## C0[9,8]   | 0.00  | 0.00 | 0.29 | -0.54 | -0.21 | -0.01 | 0.20 |
| ## C0[9,9]   | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[9,10]  | 0.01  | 0.00 | 0.29 | -0.55 | -0.20 | 0.01  | 0.21 |
| ## C0[9,11]  | 0.00  | 0.01 | 0.29 | -0.56 | -0.21 | 0.00  | 0.20 |
| ## C0[10,1]  | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | 0.00  | 0.21 |
| ## C0[10,2]  | 0.00  | 0.00 | 0.29 | -0.55 | -0.21 | 0.00  | 0.21 |
| ## C0[10,3]  | 0.00  | 0.00 | 0.29 | -0.56 | -0.22 | 0.00  | 0.21 |
| ## C0[10,4]  | 0.00  | 0.01 | 0.29 | -0.56 | -0.21 | -0.01 | 0.21 |
| ## C0[10,5]  | 0.00  | 0.00 | 0.28 | -0.54 | -0.21 | -0.01 | 0.20 |
| ## C0[10,6]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.20 | -0.01 | 0.20 |
| ## C0[10,7]  | 0.01  | 0.00 | 0.29 | -0.54 | -0.19 | 0.01  | 0.21 |
| ## C0[10,8]  | 0.00  | 0.01 | 0.29 | -0.53 | -0.20 | 0.00  | 0.21 |
| ## C0[10,9]  | 0.01  | 0.00 | 0.29 | -0.55 | -0.20 | 0.01  | 0.21 |
| ## C0[10,10] | 1.00  | 0.00 | 0.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| ## C0[10,11] | 0.01  | 0.01 | 0.28 | -0.53 | -0.19 | 0.01  | 0.21 |
| ## C0[11,1]  | 0.00  | 0.01 | 0.30 | -0.57 | -0.21 | 0.01  | 0.22 |
| ## C0[11,2]  | 0.00  | 0.01 | 0.29 | -0.57 | -0.20 | 0.00  | 0.21 |
| ## C0[11,3]  | -0.01 | 0.00 | 0.29 | -0.55 | -0.21 | -0.01 | 0.20 |
| ## C0[11,4]  | 0.00  | 0.00 | 0.29 | -0.56 | -0.21 | 0.00  | 0.21 |
| ## C0[11,5]  | 0.00  | 0.00 | 0.29 | -0.57 | -0.20 | 0.00  | 0.20 |
| ## C0[11,6]  | -0.01 | 0.01 | 0.30 | -0.60 | -0.21 | 0.00  | 0.20 |
| ## C0[11,7]  | -0.01 | 0.00 | 0.29 | -0.56 | -0.21 | -0.01 | 0.20 |
| ## C0[11,8]  | 0.00  | 0.01 | 0.29 | -0.56 | -0.20 | 0.01  | 0.22 |

```

## C0[11,9]      0.00    0.01    0.29   -0.56   -0.21    0.00    0.20
## C0[11,10]     0.01    0.01    0.28   -0.53   -0.19    0.01    0.21
## C0[11,11]     1.00    0.00    0.00    1.00    1.00    1.00    1.00
## v0            0.29    0.00    0.32    0.03    0.13    0.22    0.37
## s0           49.27    8.20  563.26    0.07    0.68    1.64    5.08
## sigma        54.23    0.04    1.87   50.73   52.93   54.15   55.41
## lp_--       -2066.85    0.23    6.19 -2081.15 -2070.53 -2066.40 -2062.52
##              97.5% n_eff Rhat
## beta[1]      157.56  1116 1.00
## beta[2]      108.39  3485 1.00
## beta[3]     -116.05  2174 1.00
## beta[4]      650.33  3374 1.00
## beta[5]      454.14  4122 1.00
## beta[6]       45.71   981 1.01
## beta[7]     1201.15   957 1.01
## beta[8]      510.56  1101 1.01
## beta[9]      493.45  2575 1.00
## beta[10]     1089.01  1177 1.00
## beta[11]      195.22  2155 1.00
## sigma2      3386.29  2709 1.00
## mu_beta[1]   262.91  2995 1.00
## mu_beta[2]   151.70  3240 1.00
## mu_beta[3]   -72.08  3140 1.00
## mu_beta[4]   687.61  3396 1.00
## mu_beta[5]   491.07  3687 1.00
## mu_beta[6]    54.89   973 1.01
## mu_beta[7]  1211.30  1025 1.01
## mu_beta[8]   528.59  1061 1.01
## mu_beta[9]   502.49  2751 1.00
## mu_beta[10]  1109.27  1295 1.00
## mu_beta[11]  236.26  3270 1.00
## C0[1,1]      1.00   NaN  NaN
## C0[1,2]      0.55  3464 1.00
## C0[1,3]      0.55  5576 1.00
## C0[1,4]      0.56  5137 1.00
## C0[1,5]      0.56  5537 1.00
## C0[1,6]      0.53  4717 1.00
## C0[1,7]      0.56  5053 1.00
## C0[1,8]      0.54  6171 1.00
## C0[1,9]      0.54  6126 1.00
## C0[1,10]     0.55  3836 1.00
## C0[1,11]     0.55  2244 1.00
## C0[2,1]      0.55  3464 1.00
## C0[2,2]      1.00  9470 1.00
## C0[2,3]      0.54  2841 1.00
## C0[2,4]      0.57  2804 1.00
## C0[2,5]      0.55  3564 1.00
## C0[2,6]      0.61  1217 1.00
## C0[2,7]      0.54  4845 1.00
## C0[2,8]      0.55  1479 1.00
## C0[2,9]      0.55  5755 1.00
## C0[2,10]     0.55  4114 1.00
## C0[2,11]     0.54  2179 1.00
## C0[3,1]      0.55  5576 1.00

```

|             |      |      |      |
|-------------|------|------|------|
| ## C0[3,2]  | 0.54 | 2841 | 1.00 |
| ## C0[3,3]  | 1.00 | 7917 | 1.00 |
| ## C0[3,4]  | 0.54 | 3254 | 1.00 |
| ## C0[3,5]  | 0.55 | 2495 | 1.00 |
| ## C0[3,6]  | 0.53 | 3598 | 1.00 |
| ## C0[3,7]  | 0.55 | 4975 | 1.00 |
| ## C0[3,8]  | 0.55 | 2780 | 1.00 |
| ## C0[3,9]  | 0.55 | 3079 | 1.00 |
| ## C0[3,10] | 0.56 | 3699 | 1.00 |
| ## C0[3,11] | 0.55 | 4669 | 1.00 |
| ## C0[4,1]  | 0.56 | 5137 | 1.00 |
| ## C0[4,2]  | 0.57 | 2804 | 1.00 |
| ## C0[4,3]  | 0.54 | 3254 | 1.00 |
| ## C0[4,4]  | 1.00 | 8181 | 1.00 |
| ## C0[4,5]  | 0.56 | 3952 | 1.00 |
| ## C0[4,6]  | 0.57 | 2092 | 1.00 |
| ## C0[4,7]  | 0.56 | 2839 | 1.00 |
| ## C0[4,8]  | 0.54 | 4266 | 1.00 |
| ## C0[4,9]  | 0.55 | 4092 | 1.00 |
| ## C0[4,10] | 0.56 | 2113 | 1.00 |
| ## C0[4,11] | 0.56 | 4282 | 1.00 |
| ## C0[5,1]  | 0.56 | 5537 | 1.00 |
| ## C0[5,2]  | 0.55 | 3564 | 1.00 |
| ## C0[5,3]  | 0.55 | 2495 | 1.00 |
| ## C0[5,4]  | 0.56 | 3952 | 1.00 |
| ## C0[5,5]  | 1.00 | 8078 | 1.00 |
| ## C0[5,6]  | 0.54 | 3626 | 1.00 |
| ## C0[5,7]  | 0.55 | 2708 | 1.00 |
| ## C0[5,8]  | 0.55 | 4219 | 1.00 |
| ## C0[5,9]  | 0.55 | 1909 | 1.00 |
| ## C0[5,10] | 0.53 | 4246 | 1.00 |
| ## C0[5,11] | 0.55 | 3534 | 1.00 |
| ## C0[6,1]  | 0.53 | 4717 | 1.00 |
| ## C0[6,2]  | 0.61 | 1217 | 1.00 |
| ## C0[6,3]  | 0.53 | 3598 | 1.00 |
| ## C0[6,4]  | 0.57 | 2092 | 1.00 |
| ## C0[6,5]  | 0.54 | 3626 | 1.00 |
| ## C0[6,6]  | 1.00 | 8194 | 1.00 |
| ## C0[6,7]  | 0.57 | 2551 | 1.00 |
| ## C0[6,8]  | 0.55 | 1177 | 1.01 |
| ## C0[6,9]  | 0.55 | 3306 | 1.00 |
| ## C0[6,10] | 0.55 | 4412 | 1.00 |
| ## C0[6,11] | 0.56 | 1214 | 1.01 |
| ## C0[7,1]  | 0.56 | 5053 | 1.00 |
| ## C0[7,2]  | 0.54 | 4845 | 1.00 |
| ## C0[7,3]  | 0.55 | 4975 | 1.00 |
| ## C0[7,4]  | 0.56 | 2839 | 1.00 |
| ## C0[7,5]  | 0.55 | 2708 | 1.00 |
| ## C0[7,6]  | 0.57 | 2551 | 1.00 |
| ## C0[7,7]  | 1.00 | 5909 | 1.00 |
| ## C0[7,8]  | 0.57 | 2280 | 1.00 |
| ## C0[7,9]  | 0.56 | 2136 | 1.00 |
| ## C0[7,10] | 0.56 | 3592 | 1.00 |
| ## C0[7,11] | 0.53 | 3859 | 1.00 |

```

## C0[8,1]      0.54 6171 1.00
## C0[8,2]      0.55 1479 1.00
## C0[8,3]      0.55 2780 1.00
## C0[8,4]      0.54 4266 1.00
## C0[8,5]      0.55 4219 1.00
## C0[8,6]      0.55 1177 1.01
## C0[8,7]      0.57 2280 1.00
## C0[8,8]      1.00 4609 1.00
## C0[8,9]      0.56 3645 1.00
## C0[8,10]     0.56 2957 1.00
## C0[8,11]     0.54 2300 1.00
## C0[9,1]      0.54 6126 1.00
## C0[9,2]      0.55 5755 1.00
## C0[9,3]      0.55 3079 1.00
## C0[9,4]      0.55 4092 1.00
## C0[9,5]      0.55 1909 1.00
## C0[9,6]      0.55 3306 1.00
## C0[9,7]      0.56 2136 1.00
## C0[9,8]      0.56 3645 1.00
## C0[9,9]      1.00 7278 1.00
## C0[9,10]     0.54 3481 1.00
## C0[9,11]     0.55 2632 1.00
## C0[10,1]     0.55 3836 1.00
## C0[10,2]     0.55 4114 1.00
## C0[10,3]     0.56 3699 1.00
## C0[10,4]     0.56 2113 1.00
## C0[10,5]     0.53 4246 1.00
## C0[10,6]     0.55 4412 1.00
## C0[10,7]     0.56 3592 1.00
## C0[10,8]     0.56 2957 1.00
## C0[10,9]     0.54 3481 1.00
## C0[10,10]    1.00 6964 1.00
## C0[10,11]    0.57 2562 1.00
## C0[11,1]     0.55 2244 1.00
## C0[11,2]     0.54 2179 1.00
## C0[11,3]     0.55 4669 1.00
## C0[11,4]     0.56 4282 1.00
## C0[11,5]     0.55 3534 1.00
## C0[11,6]     0.56 1214 1.01
## C0[11,7]     0.53 3859 1.00
## C0[11,8]     0.54 2300 1.00
## C0[11,9]     0.55 2632 1.00
## C0[11,10]    0.57 2562 1.00
## C0[11,11]    1.00 9193 1.00
## v0           0.84 4774 1.00
## s0           244.74 4724 1.00
## sigma        58.19 2791 1.00
## lp__         -2056.08 714 1.01
##
## Samples were drawn using NUTS(diag_e) at Mon Dec 11 20:55:59 2023.
## For each parameter, n_eff is a crude measure of effective sample size,
## and Rhat is the potential scale reduction factor on split chains (at
## convergence, Rhat=1).

```

```
# Plot the posterior distributions
plot(stan_fit_hier,
     pars=c("beta", "sigma"))
```

```
## ci_level: 0.8 (80% intervals)
```

```
## outer_level: 0.95 (95% intervals)
```

