MCMC Diagnostics - IFLS data

Sarah Teichman

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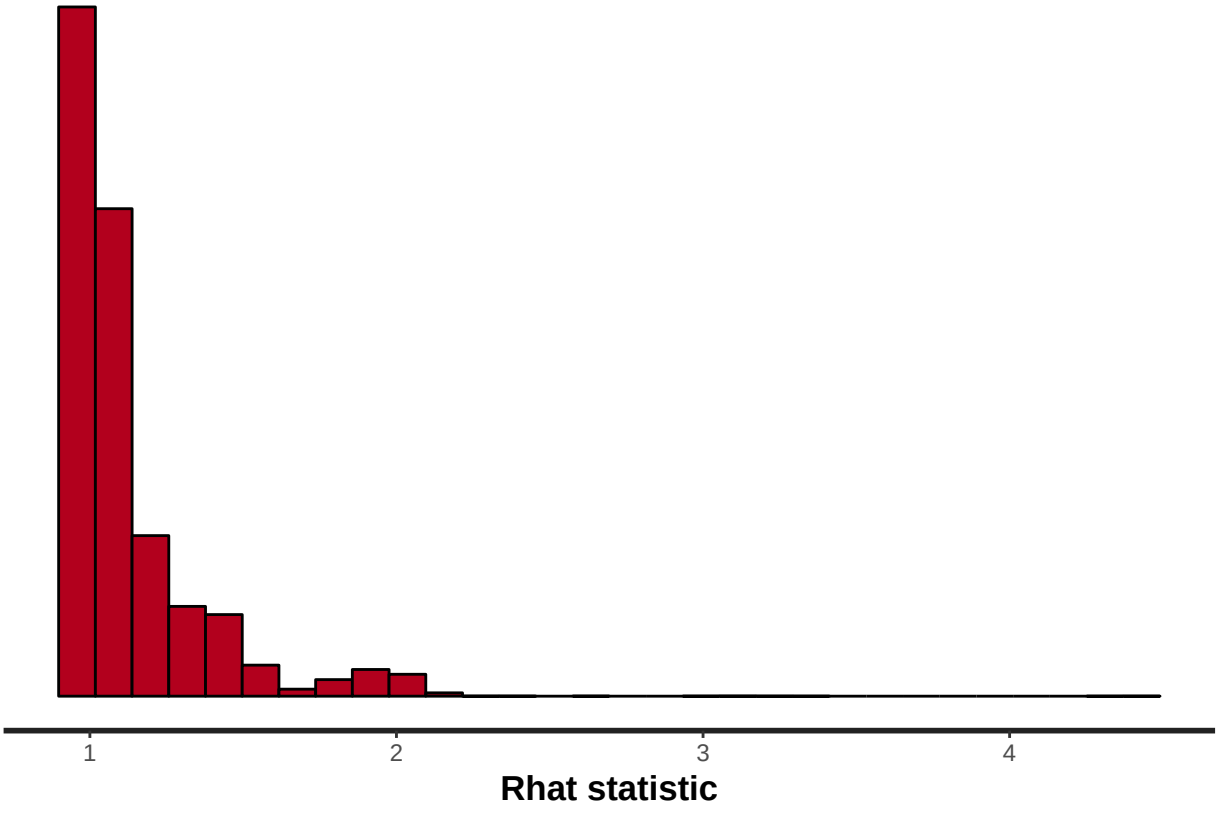
```
K <- 7
Ti <- 3
N <- 1973
```

General MCMC diagnostic plots

Overall model diagnostics from rstan package.

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

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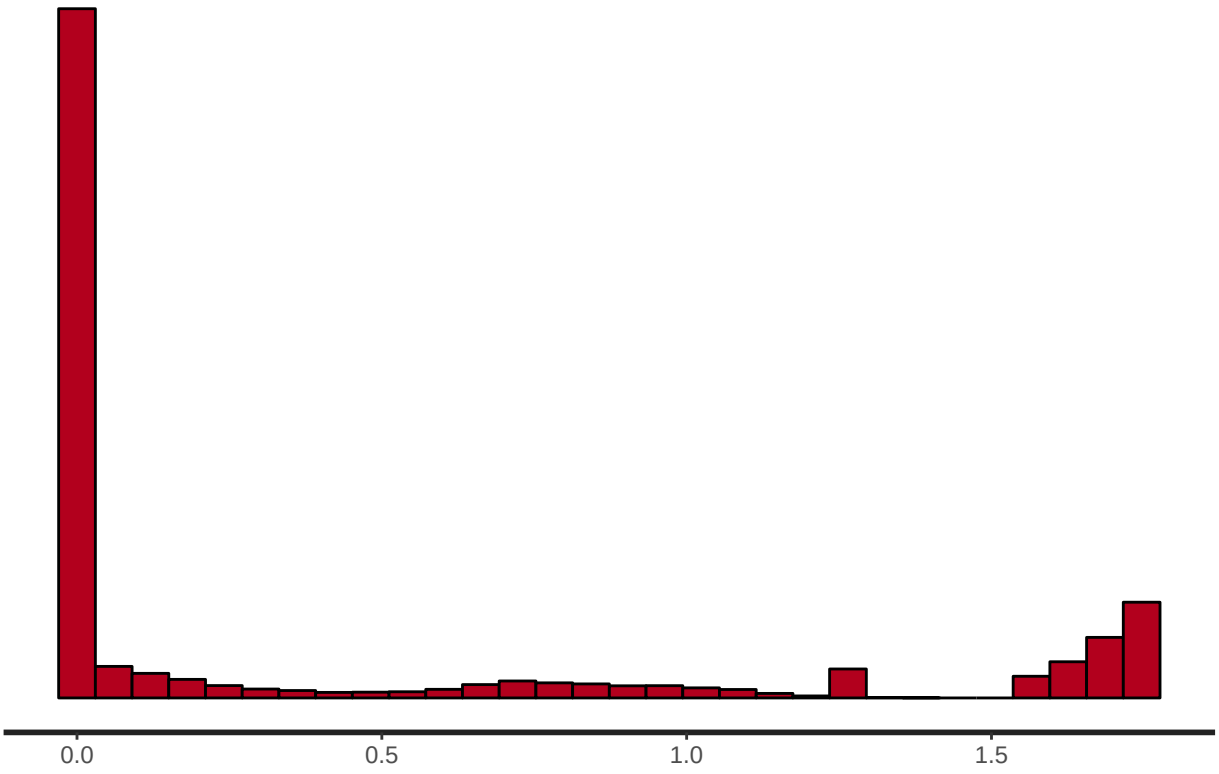
```




```
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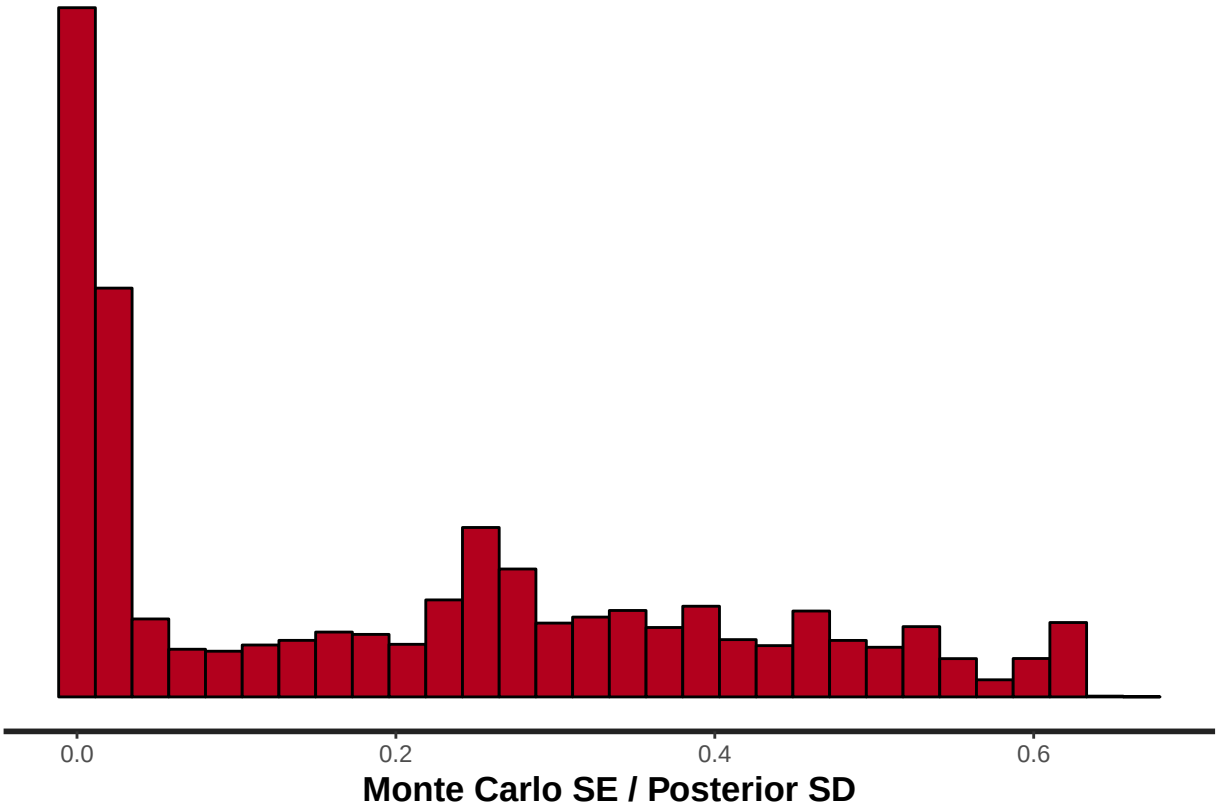
```

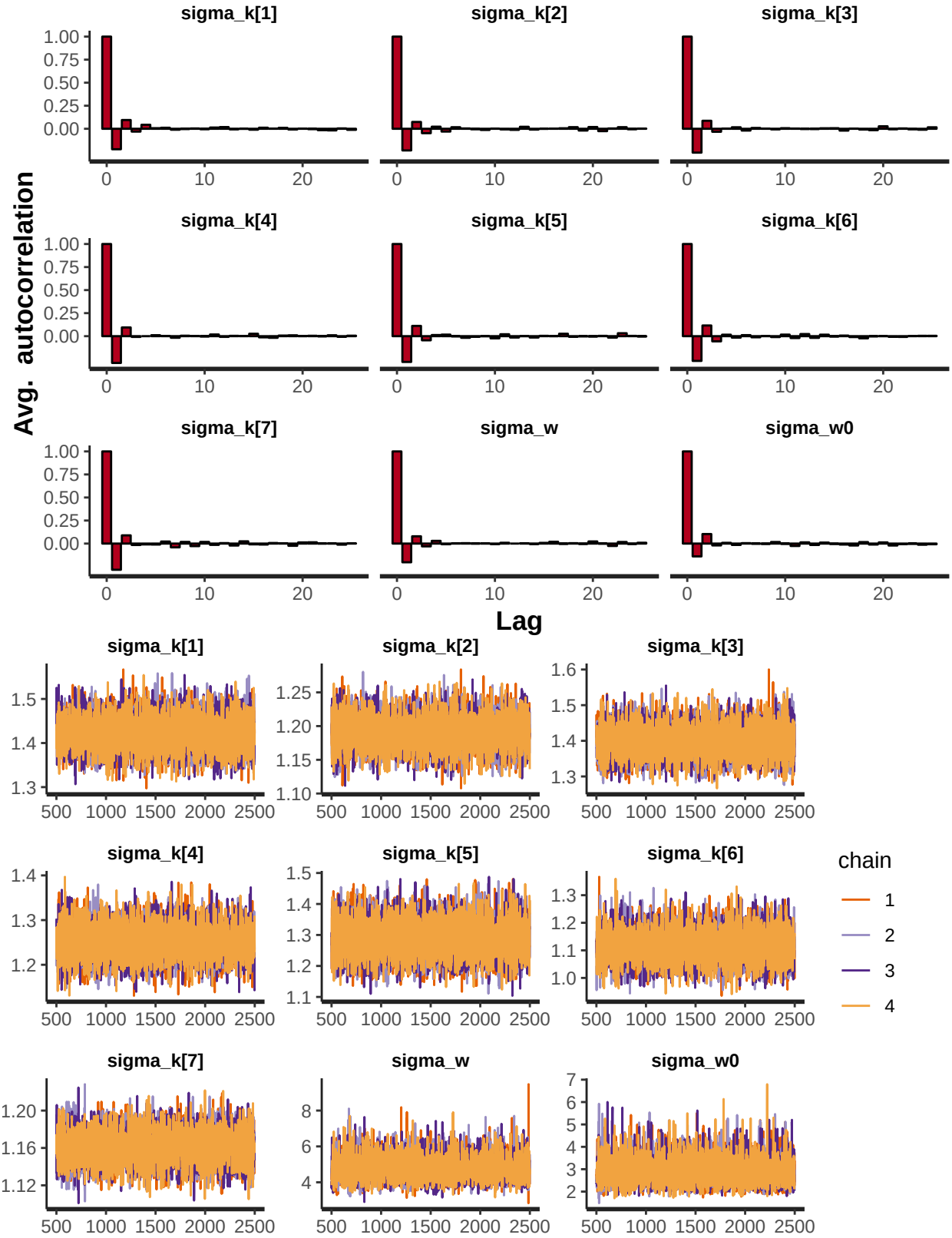


Individual Parameter Diagnostics

Individual parameter plots. Autocorrelation and trace plots for individual parameters, and histograms of posterior medians for group parameters.

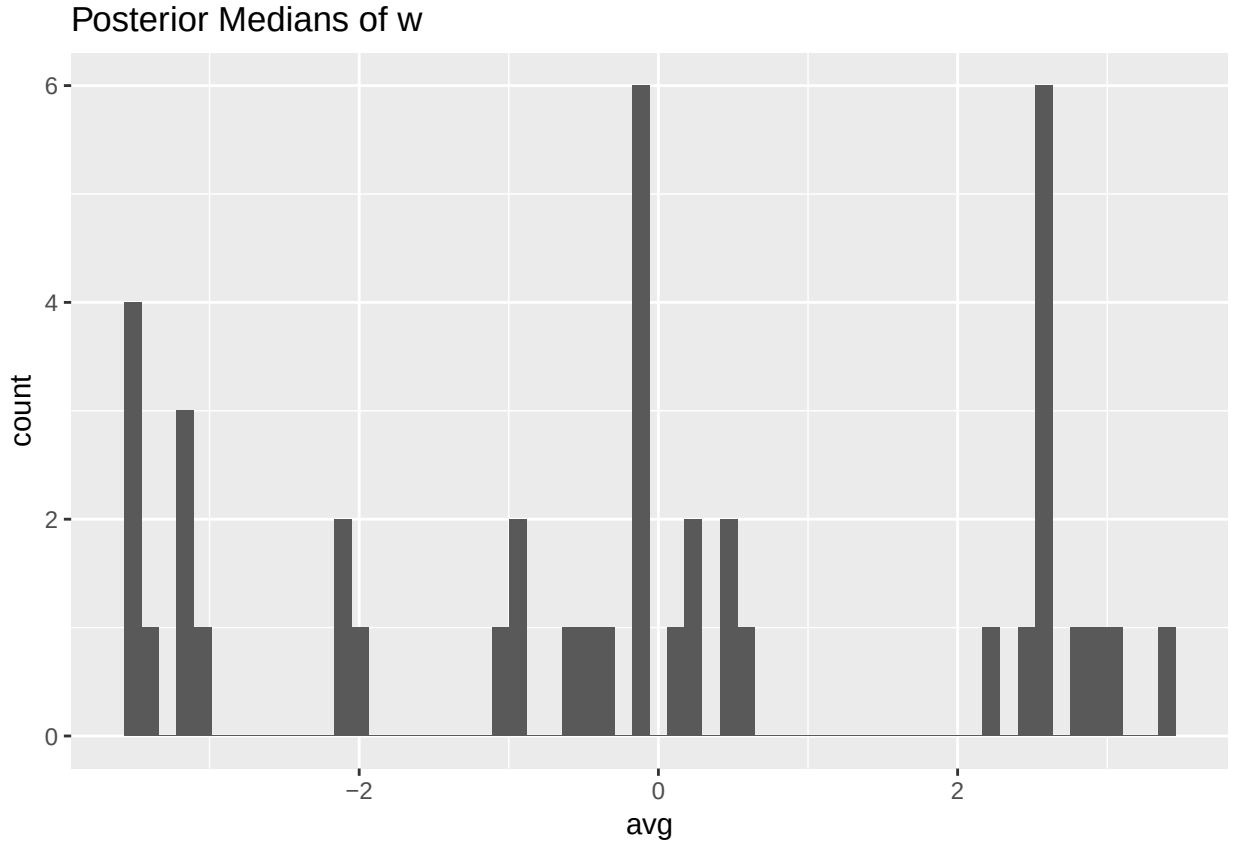
```
get_single_plots <- function(fit, param) {
  print(fit_summ[param,c(1,2,3,5,6,7,9,10)])
  print(stan_ac(fit, pars = param))
  print(rstan::traceplot(fit, pars = param))
}
get_aggreg_plots <- function(fit, param, trim = F, trim_amount) {
  ind <- grep(paste0("^",param), rownames(as.data.frame(summary(fit)$summary)))
  medians <- data.frame(avg = as.data.frame(summary(fit)$summary)$`50%`[ind])
  print(paste0("Summary statistics for posterior medians of ",param))
  print(summary(medians))
  title <- paste0("Posterior Medians of ",param)
  print(ggplot(medians, aes(x = avg)) + geom_histogram(bins = 60) + ggtitle(title))
  if (trim == T) {
    lim <- quantile(abs(medians$avg), probs = trim_amount)
    meds_trim <- medians %>% filter(abs(medians$avg) < lim)
    print(ggplot(meds_trim, aes(x = avg)) + geom_histogram(bins = 60) +
            ggtitle(paste0(title, " Without Extreme ",100*(1-trim_amount),"%")))
  }
}
plot_fit <- function(fit) {
  get_single_plots(fit, sigma_params)
  get_aggreg_plots(fit, "w")
  get_aggreg_plots(fit, "z")
  get_aggreg_plots(fit, "p")
}
plot_fit(fit)
```

```
##                mean      se_mean         sd      25%      50%      75%
## sigma_k[1] 1.421994 0.0003733238 0.03774853 1.395789 1.421497 1.447966
## sigma_k[2] 1.189711 0.0002002102 0.02341702 1.173789 1.189254 1.204911
## sigma_k[3] 1.399514 0.0003761205 0.04262894 1.370216 1.398221 1.428068
## sigma_k[4] 1.250611 0.0003212182 0.03676237 1.225416 1.249311 1.274684
## sigma_k[5] 1.285741 0.0005133507 0.05796684 1.245423 1.282954 1.323070
## sigma_k[6] 1.113131 0.0004909005 0.05747477 1.073389 1.111042 1.150092
## sigma_k[7] 1.160702 0.0001444818 0.01707885 1.149067 1.160535 1.172213
## sigma_w    4.803436 0.0062945754 0.65262879 4.339745 4.737378 5.189954
## sigma_w0   2.927698 0.0062024947 0.58355185 2.514798 2.841386 3.249185
##                n_eff      Rhat
## sigma_k[1] 10224.183 0.9998476
## sigma_k[2] 13680.143 0.9997541
## sigma_k[3] 12845.620 0.9999158
## sigma_k[4] 13098.050 0.9998261
## sigma_k[5] 12750.606 0.9996245
## sigma_k[6] 13707.792 0.9996884
## sigma_k[7] 13973.051 0.9997796
## sigma_w    10749.780 0.9997905
## sigma_w0    8851.688 1.0011039
```

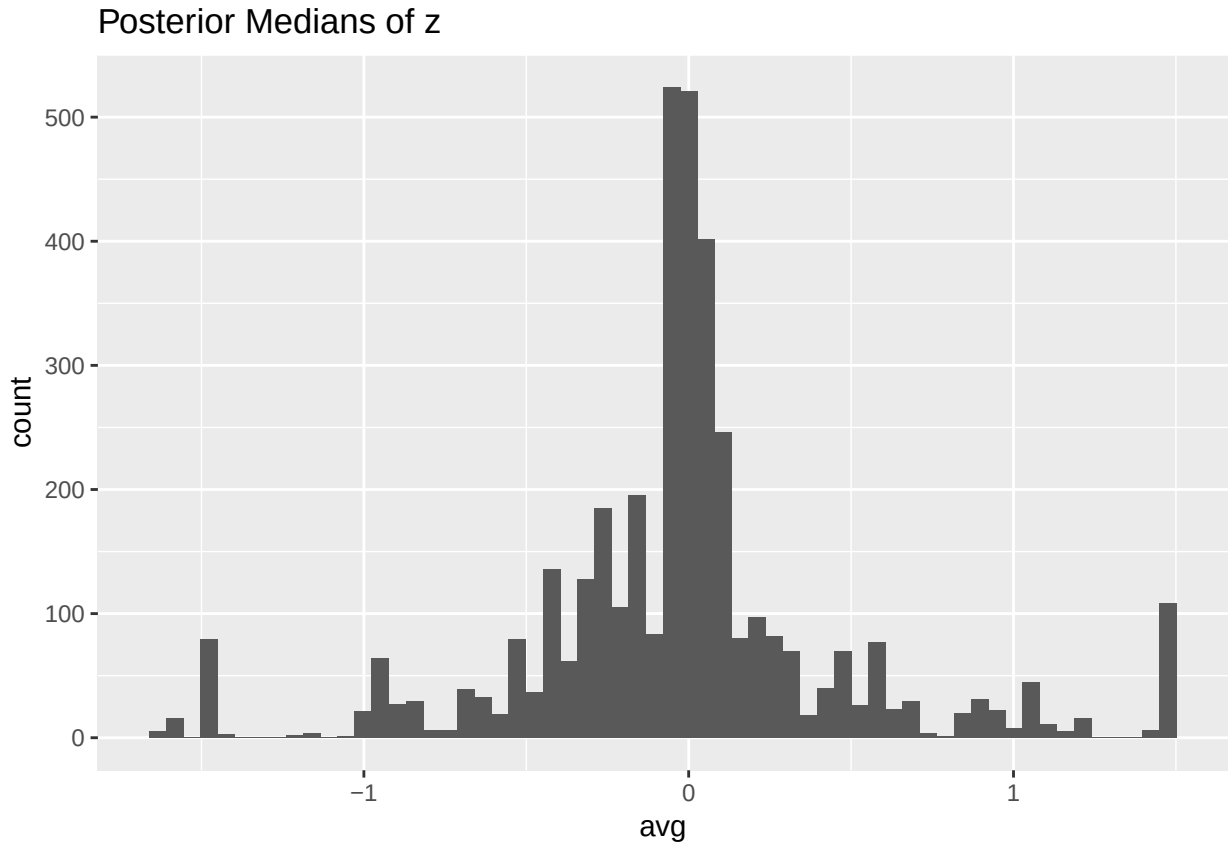



```
## [1] "Summary statistics for posterior medians of w"
##       avg
##  Min.   :-3.5441
```

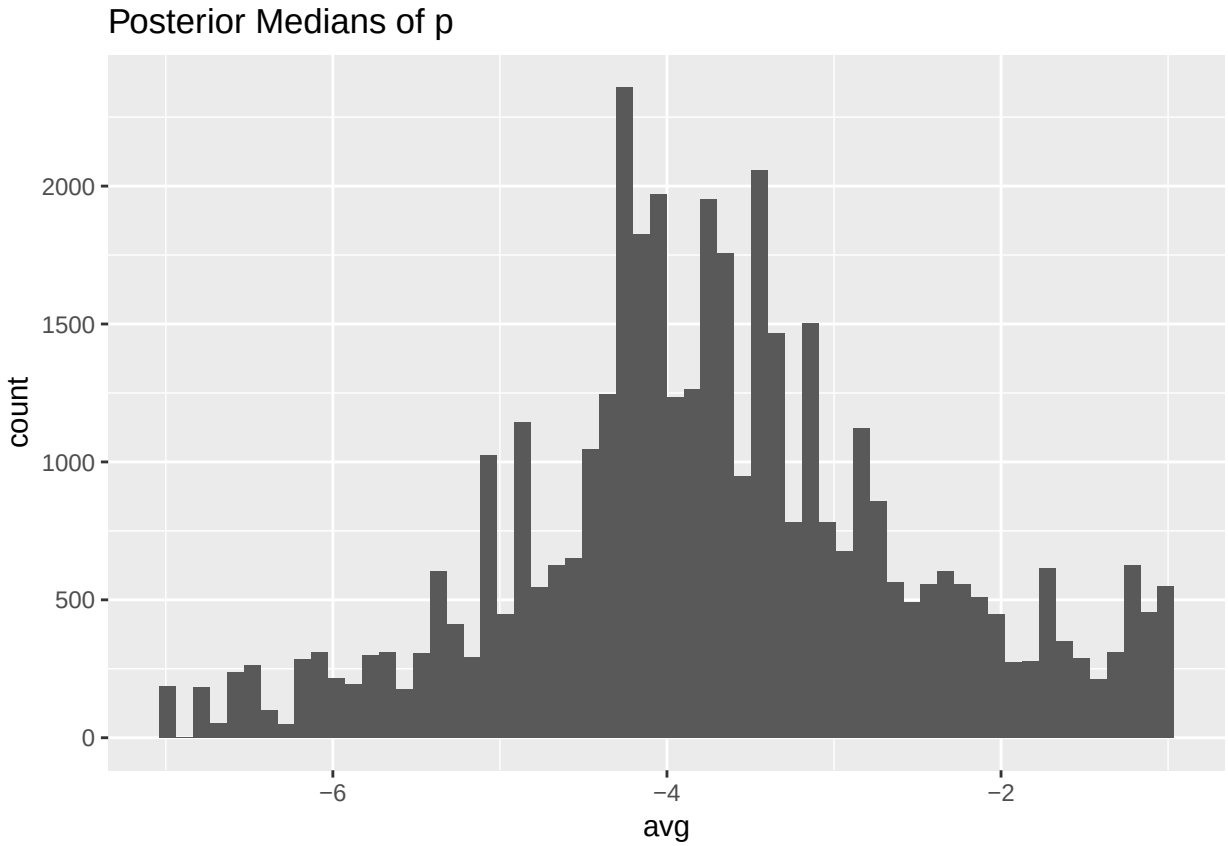
```
##  1st Qu.:-2.0764
##  Median :-0.1451
##  Mean   :-0.1724
##  3rd Qu.: 2.4098
##  Max.   : 3.3688
```




```
## [1] "Summary statistics for posterior medians of z"
##       avg
##  Min.   :-1.61993
##  1st Qu.:-0.23418
##  Median :-0.01368
##  Mean   :-0.01774
##  3rd Qu.: 0.09768
##  Max.   : 1.49076
```




```
## [1] "Summary statistics for posterior medians of p"
##       avg
##  Min.   :-6.998
##  1st Qu.:-4.378
##  Median :-3.750
##  Mean   :-3.707
##  3rd Qu.:-2.990
##  Max.   :-1.021
```


Posterior Medians of p
count
2000
1500
1000
500
0
−6
−4
−2
avg