MCMC Diagnostics - IFLS data

Sarah Teichman

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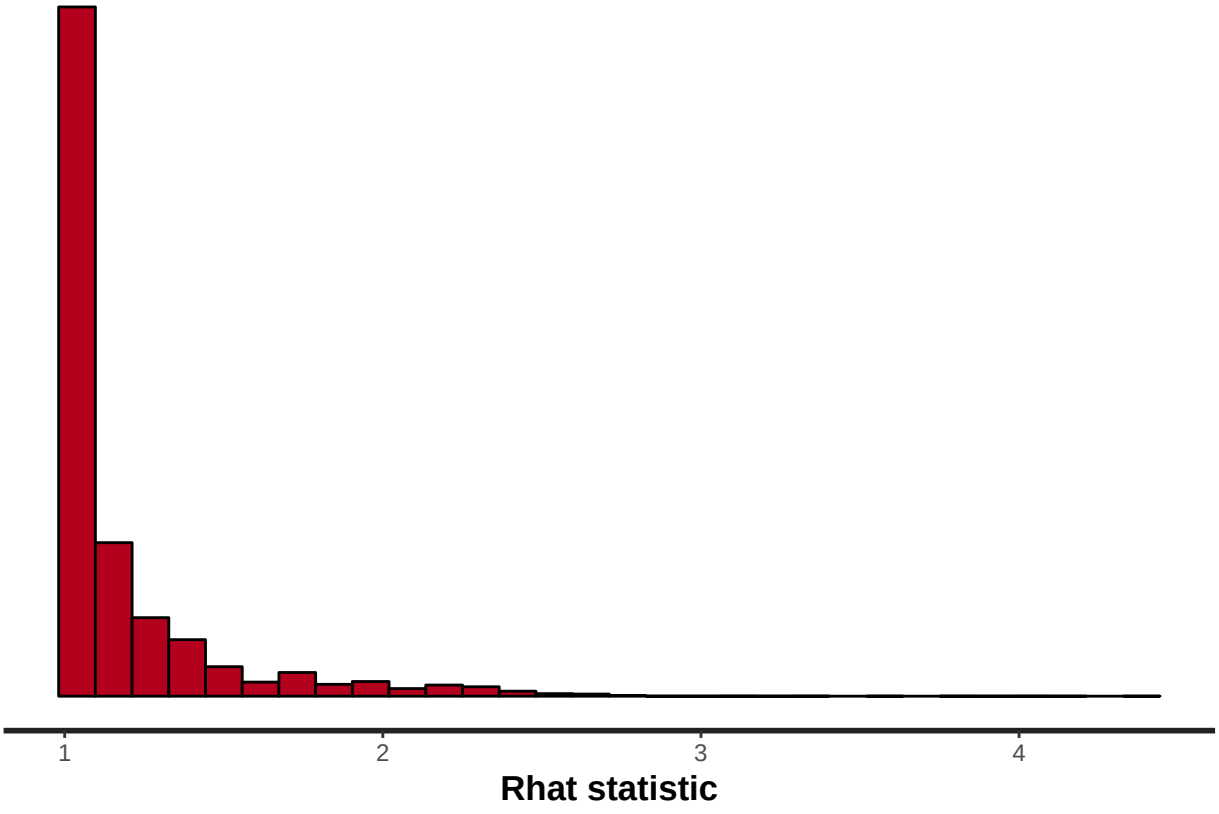
```
K <- 7
Ti <- 3
N <- 1973
```

General MCMC diagnostic plots

Overall model diagnostics from rstan package.

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




```
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```

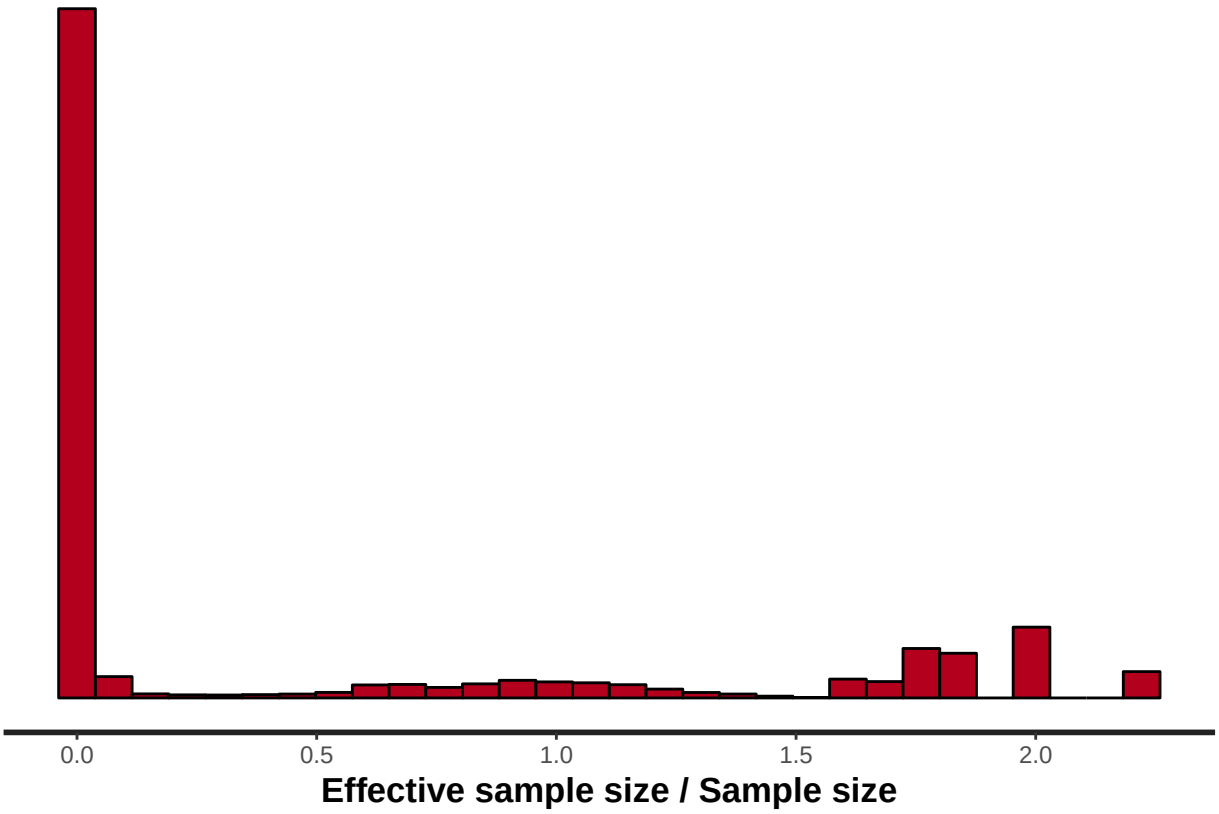


```
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```
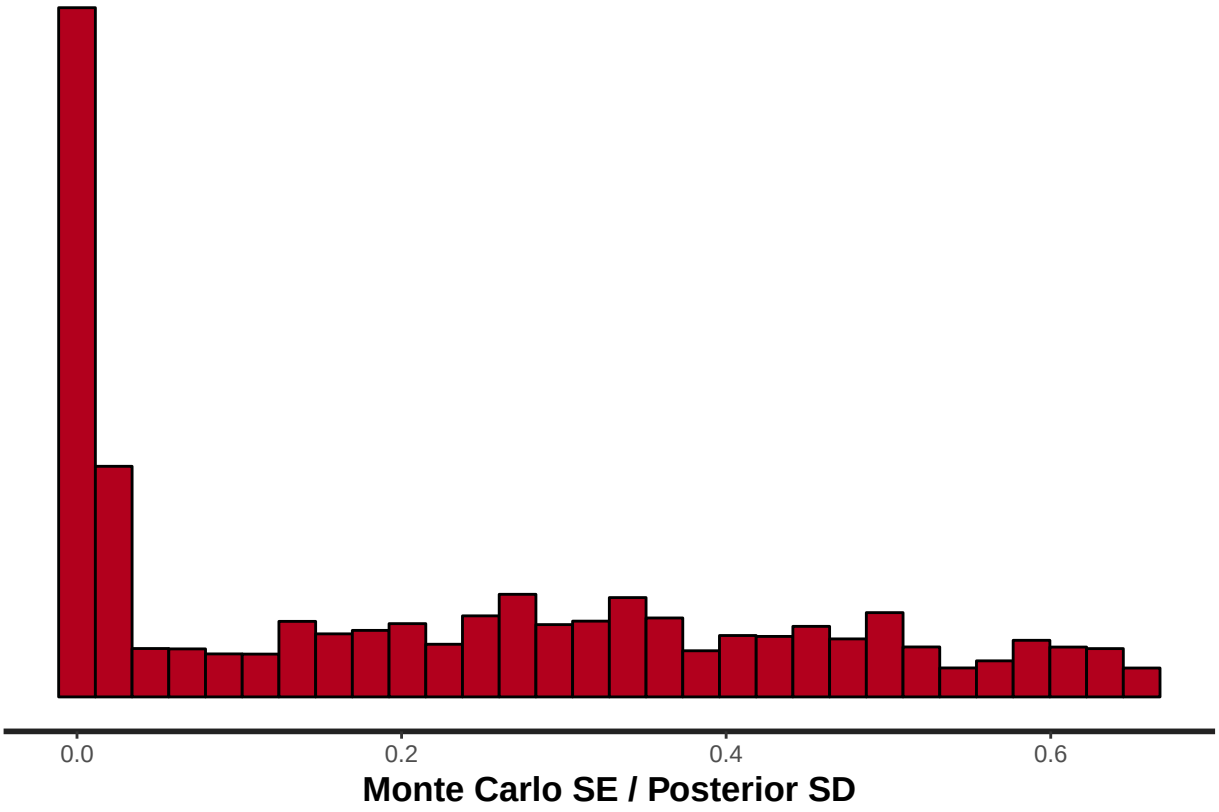
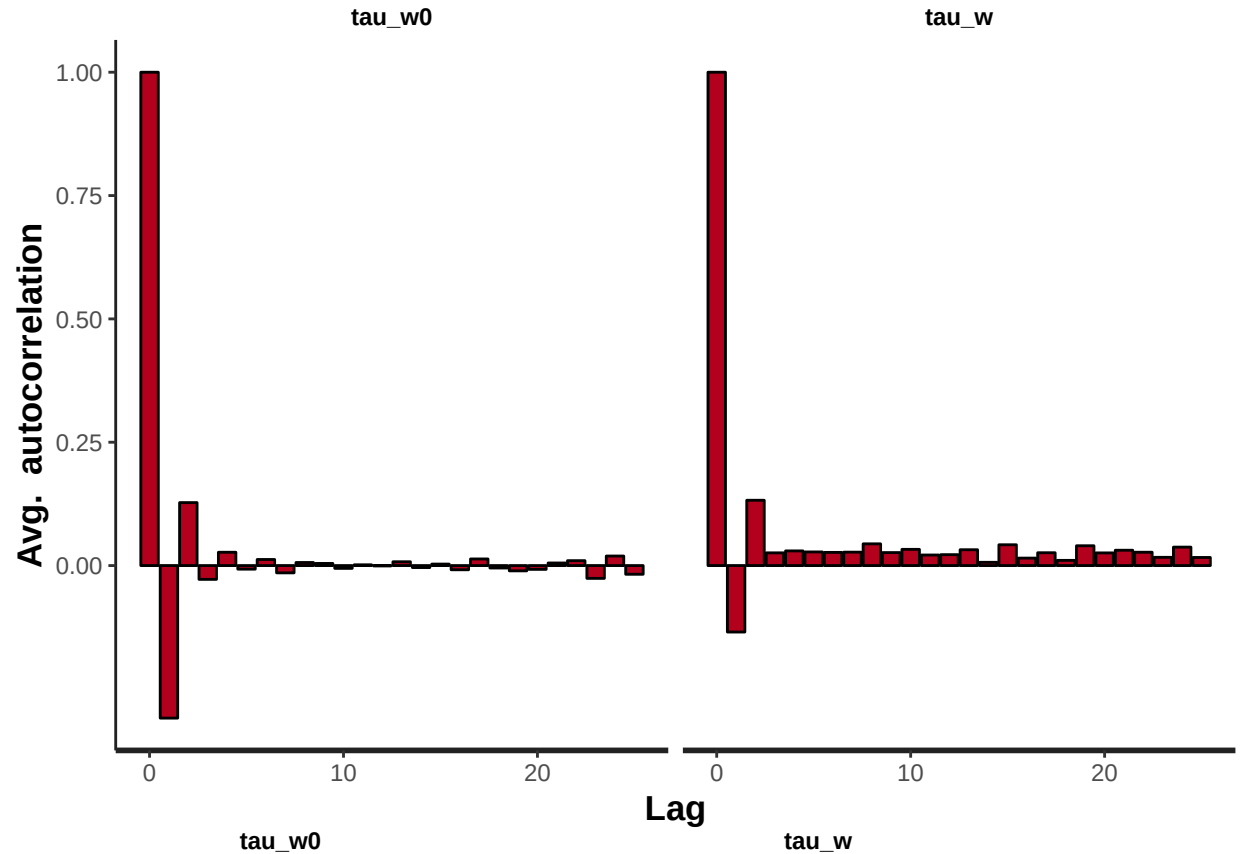



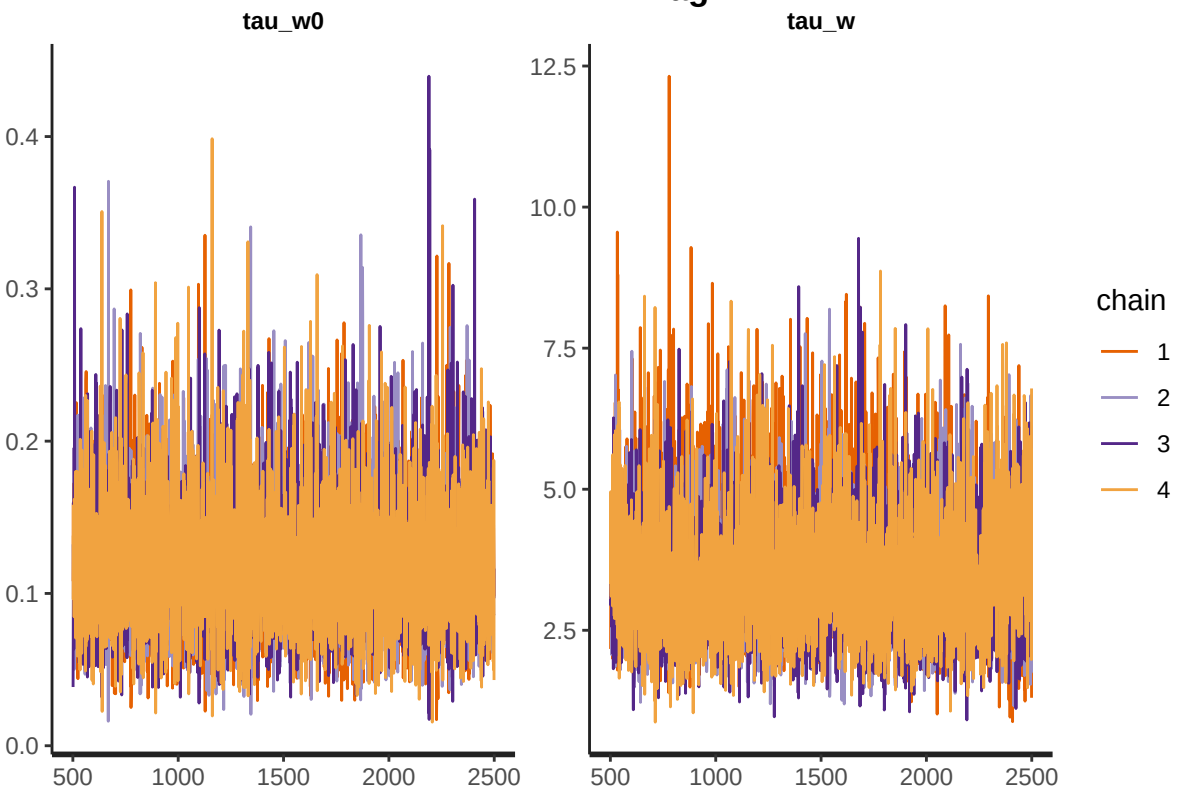
Individual Parameter Diagnostics

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, tau_params)
  get_single_plots(fit, sigma_params)
  get_aggreg_plots(fit, "w")
  get_aggreg_plots(fit, "z")
  get_aggreg_plots(fit, "p")
}
plot_fit(fit)
```

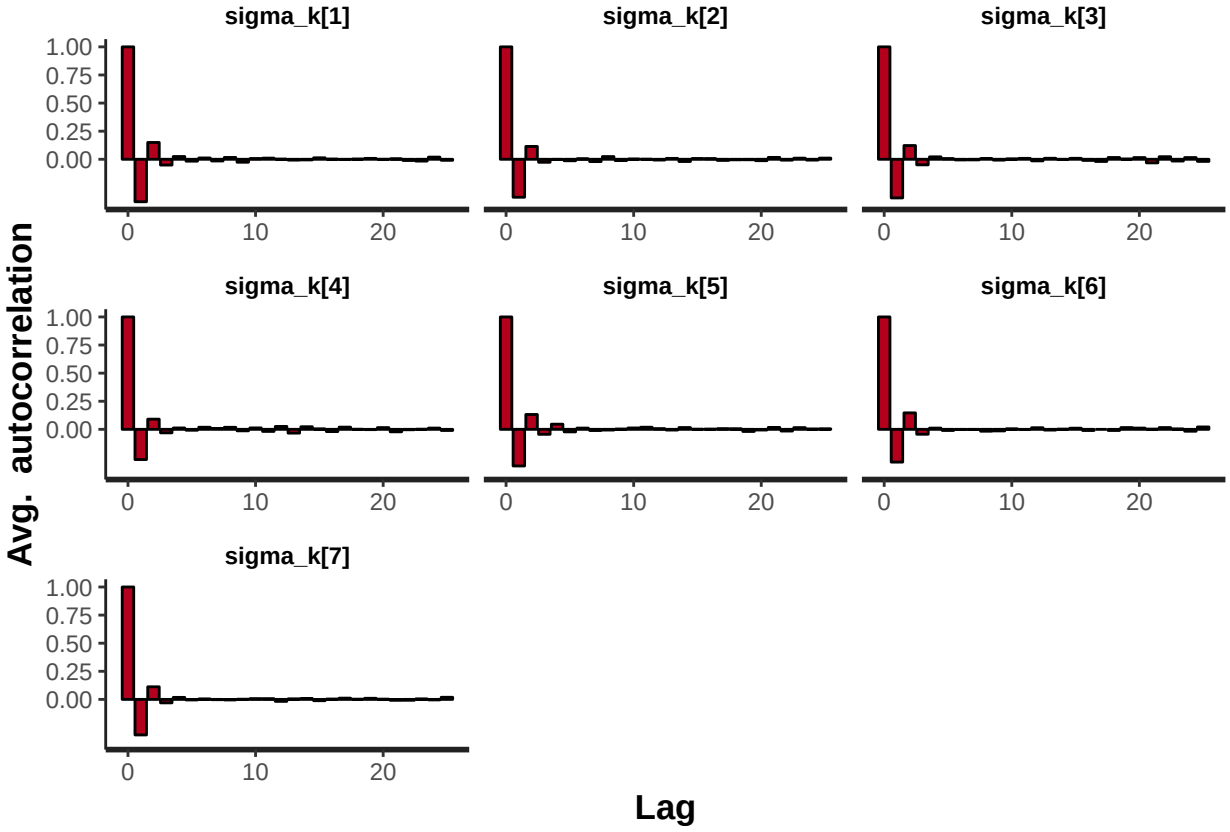
```
##             mean      se_mean         sd        25%       50%       75%
## tau_w0 0.1183714 0.0004033046 0.04539159 0.08557495 0.1121018 0.1446402
## tau_w  3.5750996 0.1067811155 1.17842776 2.72349060 3.4332422 4.2580669
##             n_eff     Rhat
## tau_w0 12667.3146 1.000570
## tau_w    121.7915 1.023057
```

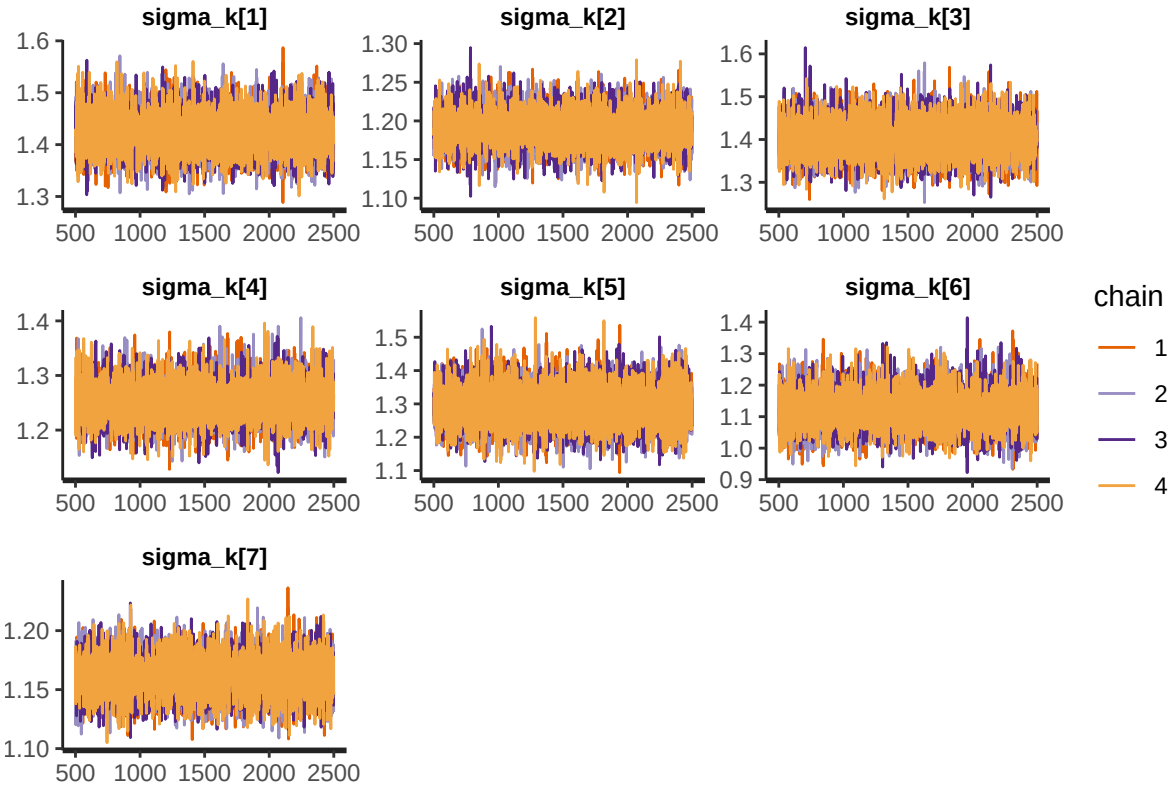




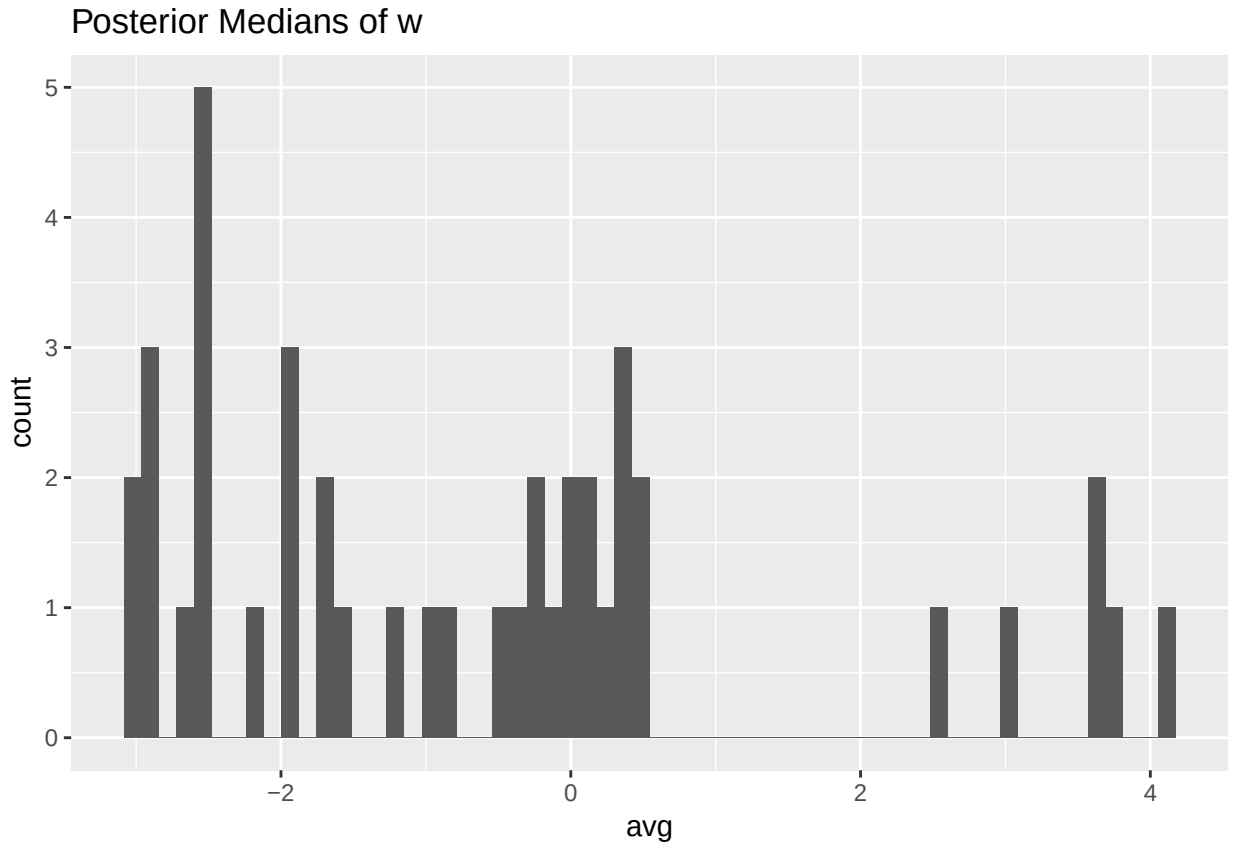

```
##                mean      se_mean          sd      25%      50%      75%
## sigma_k[1] 1.425355 0.0002906774 0.03874862 1.399259 1.424365 1.450864
## sigma_k[2] 1.190406 0.0001808798 0.02290815 1.174727 1.189985 1.205368
```

```
## sigma_k[3] 1.402456 0.0003479882 0.04394785 1.371991 1.401690 1.431205
## sigma_k[4] 1.253344 0.0003151105 0.03637359 1.228315 1.252573 1.277048
## sigma_k[5] 1.292547 0.0005063007 0.05978199 1.251928 1.290385 1.331373
## sigma_k[6] 1.120470 0.0005248018 0.06011834 1.078739 1.117163 1.159693
## sigma_k[7] 1.161574 0.0001413946 0.01700925 1.149977 1.161337 1.173017
##               n_eff      Rhat
## sigma_k[1] 17770.11 0.9997468
## sigma_k[2] 16039.84 0.9998255
## sigma_k[3] 15949.47 0.9996946
## sigma_k[4] 13324.36 0.9995860
## sigma_k[5] 13941.95 1.0000027
## sigma_k[6] 13122.70 0.9996118
## sigma_k[7] 14471.21 0.9998353
```

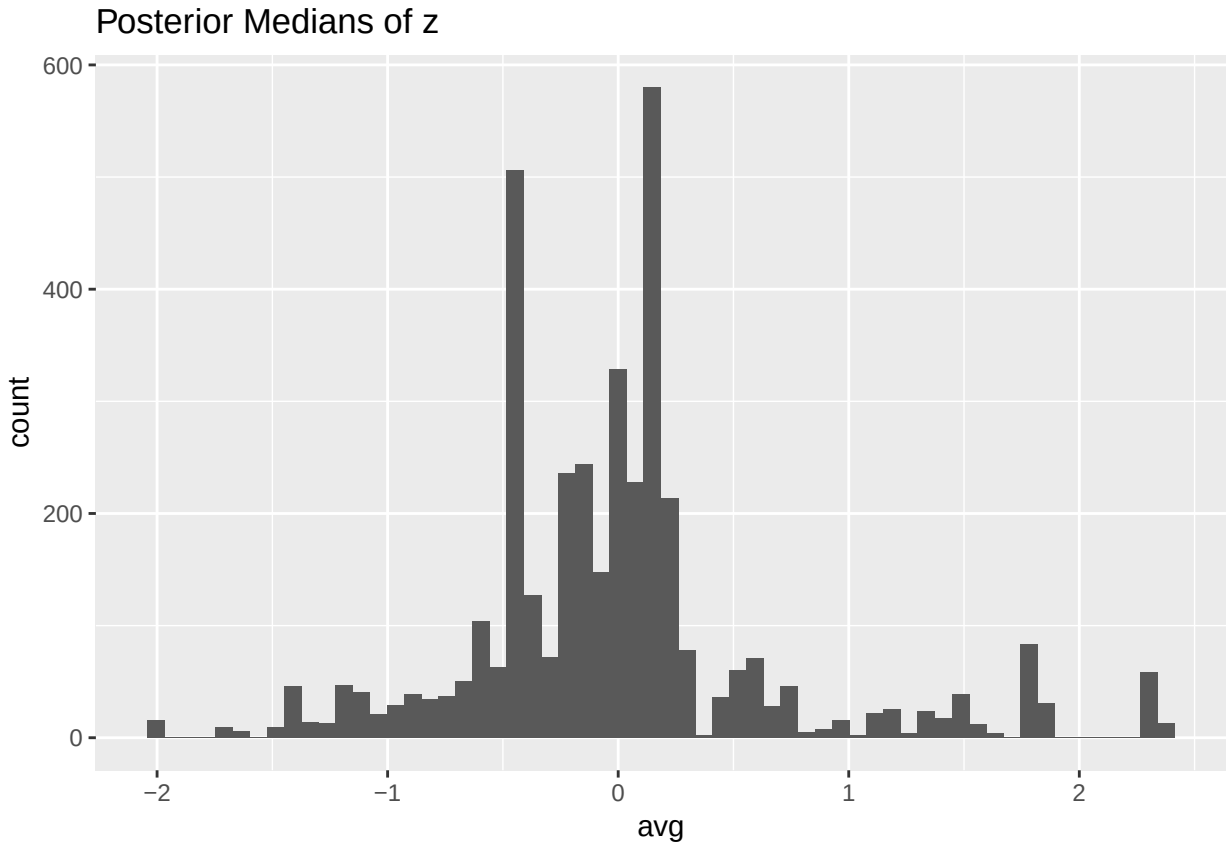




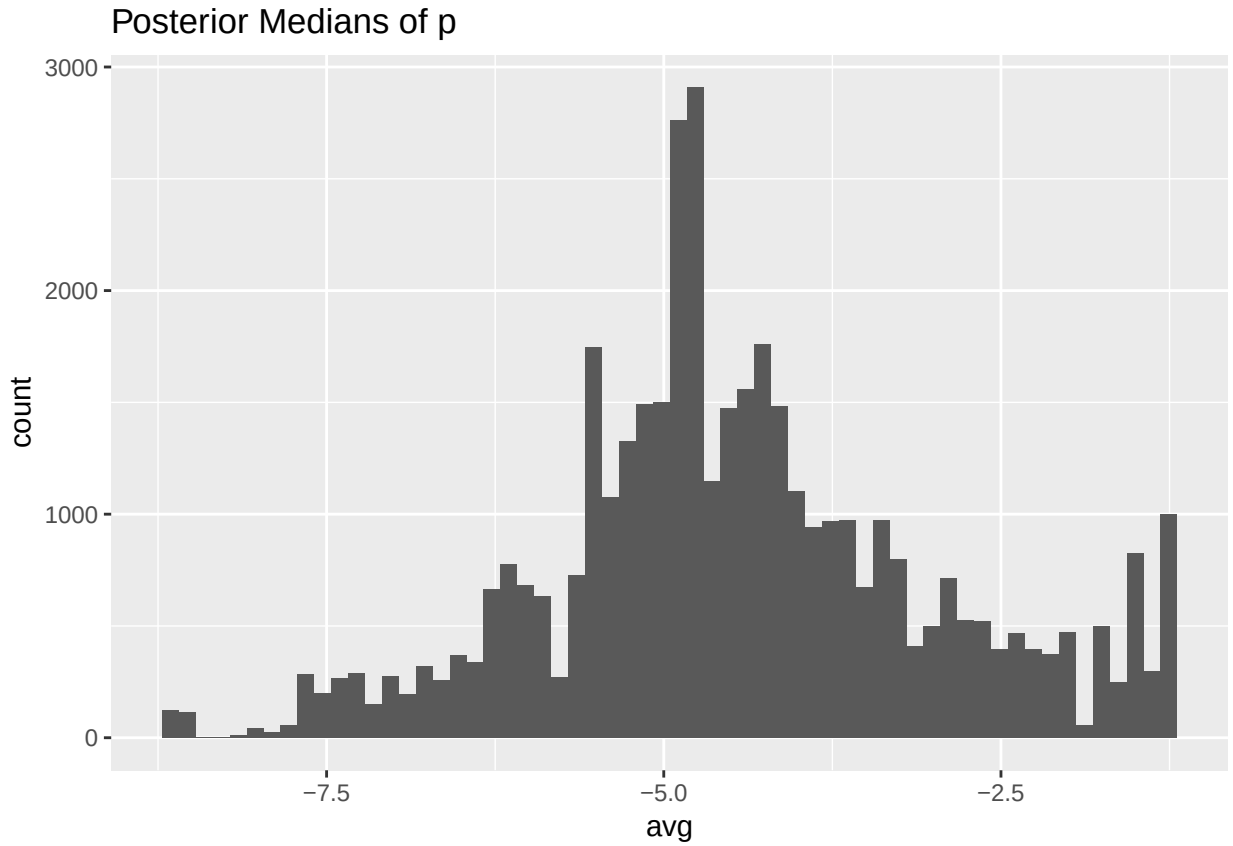

```
## [1] "Summary statistics for posterior medians of w"
##       avg
##  Min.   :-3.0467
##  1st Qu.:-2.3986
##  Median :-0.6664
##  Mean   :-0.5739
##  3rd Qu.: 0.3065
##  Max.   : 4.0912
```




```
## [1] "Summary statistics for posterior medians of z"
##       avg
##  Min.   :-2.031349
##  1st Qu.:-0.416727
##  Median :-0.011506
##  Mean   :-0.002472
##  3rd Qu.: 0.179376
##  Max.   : 2.350959
```




```
## [1] "Summary statistics for posterior medians of p"
##       avg
##  Min.   :-8.639
##  1st Qu.:-5.274
##  Median :-4.604
##  Mean   :-4.439
##  3rd Qu.:-3.610
##  Max.   :-1.236
```


Posterior Medians of p
3000
2000
1000
0
count
−7.5
−5.0
−2.5
avg