

MCMC Diagnostics - IFLS data

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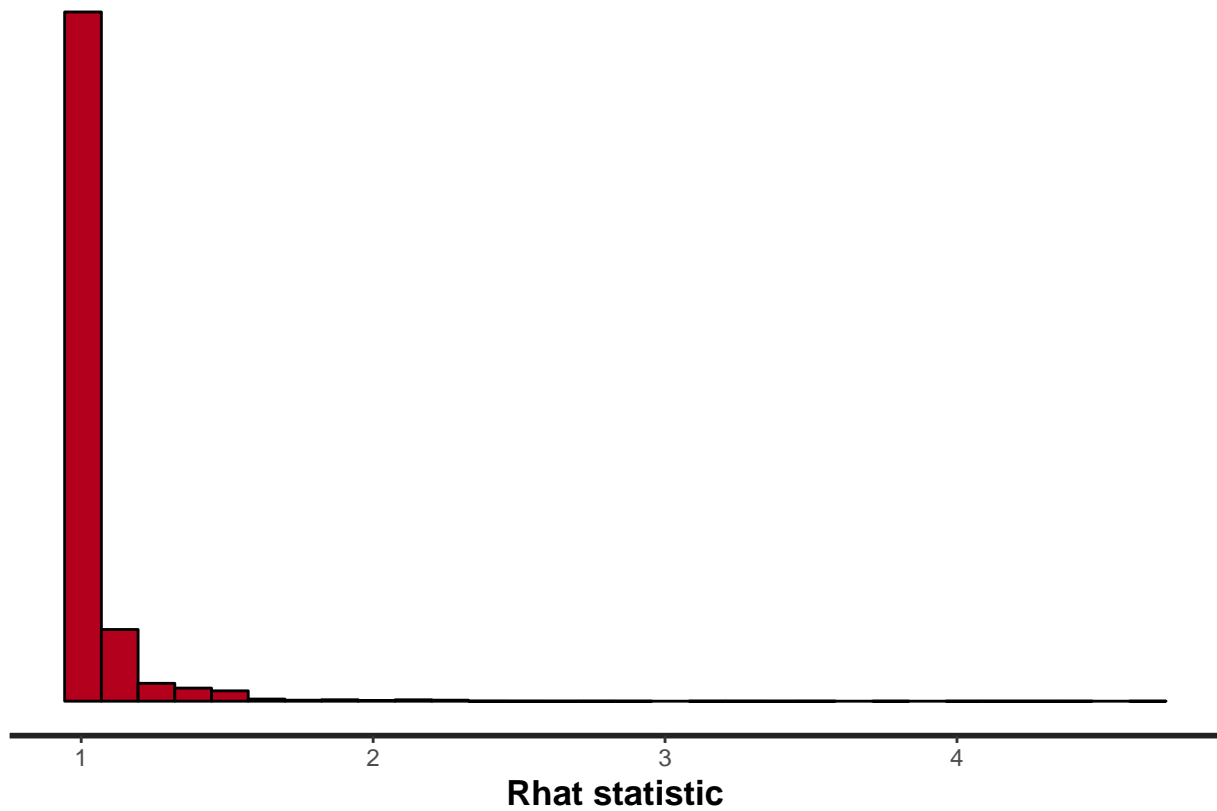
05/15/2020

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

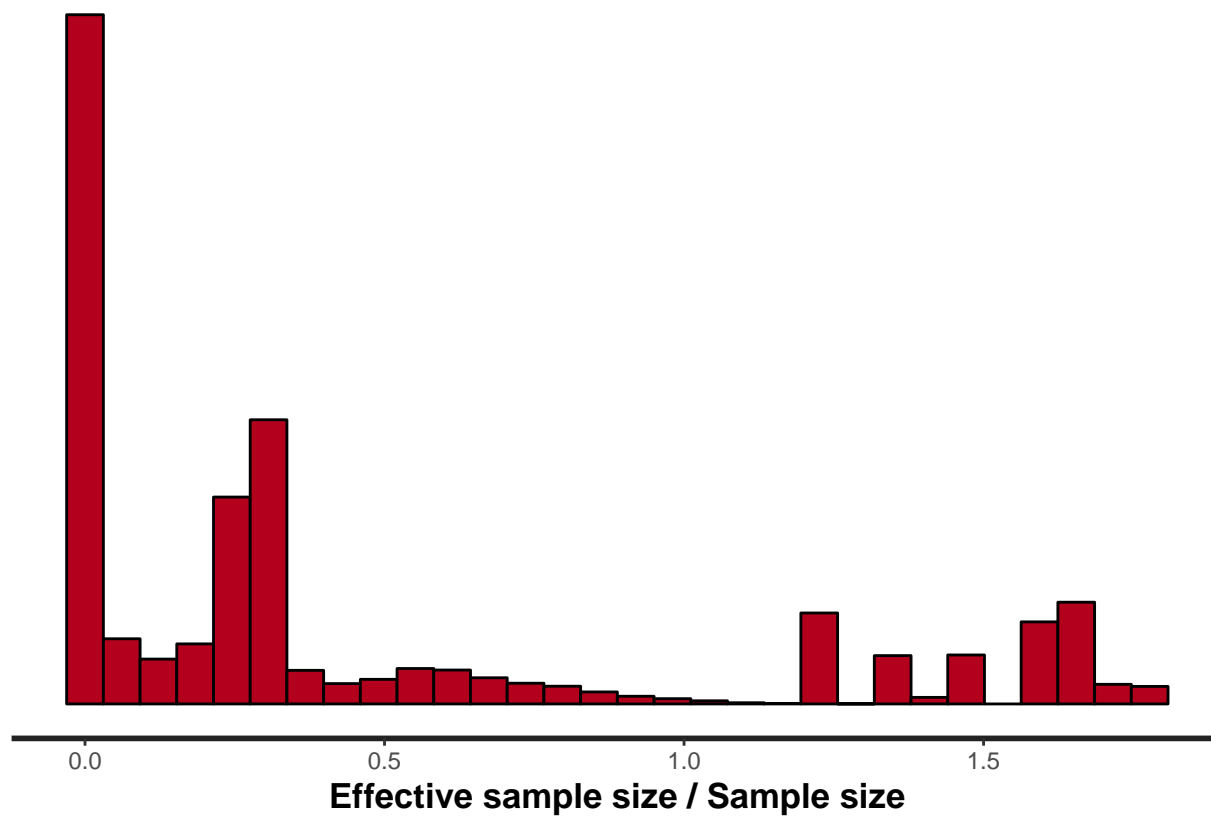
General MCMC diagnostic plots

Overall model diagnostics from rstan package.

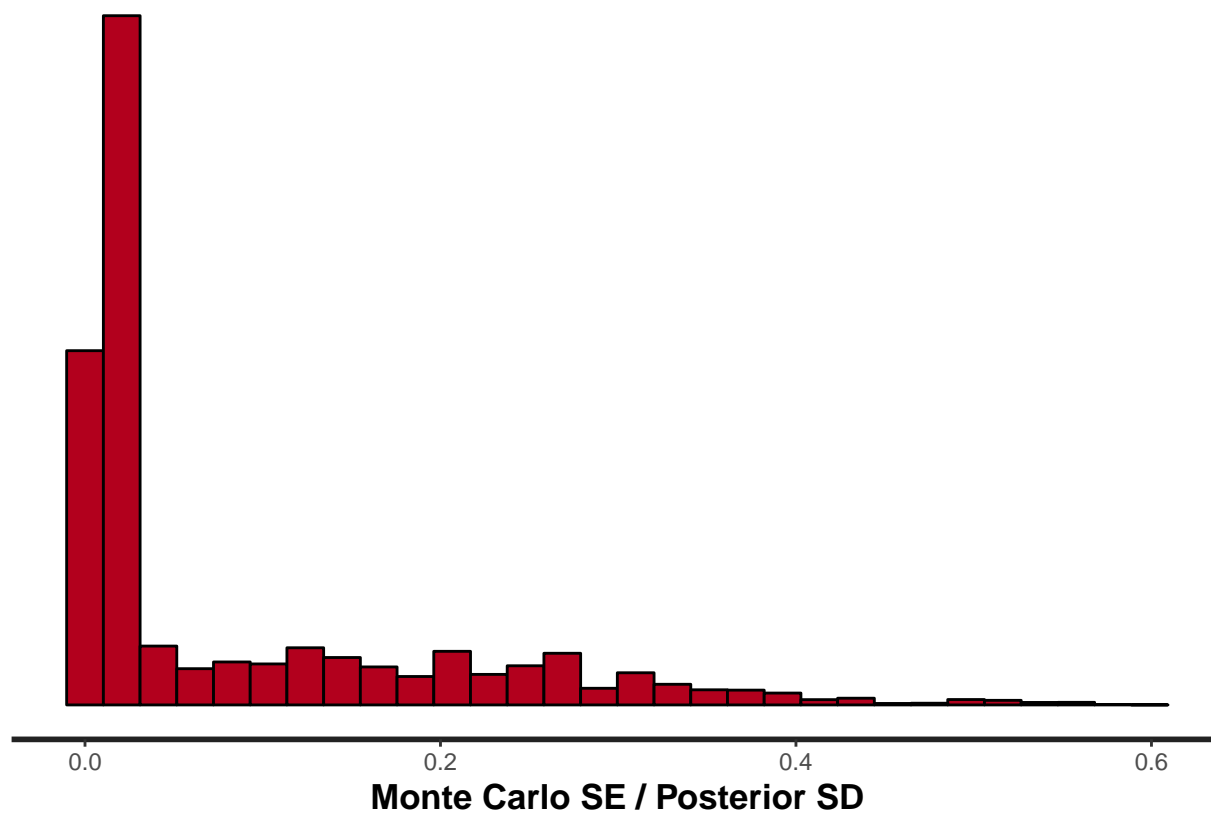
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



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```



Individual Parameter Diagnostics

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

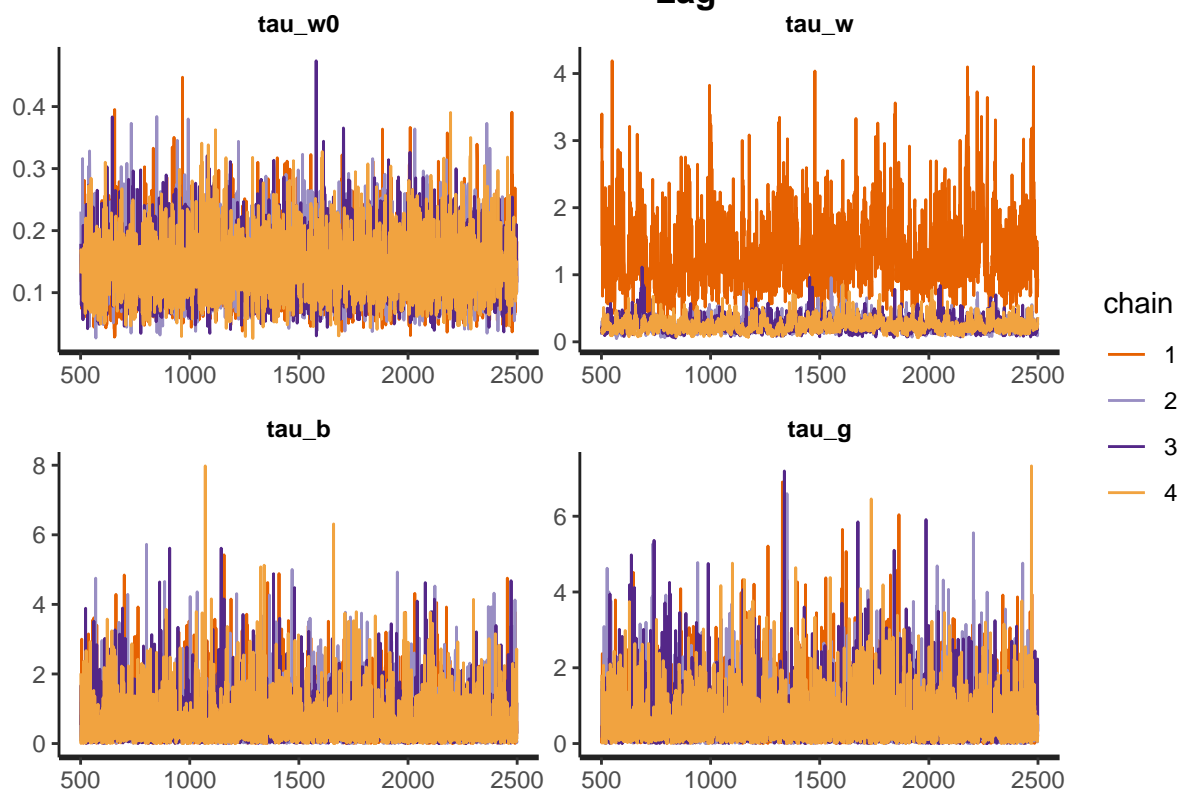
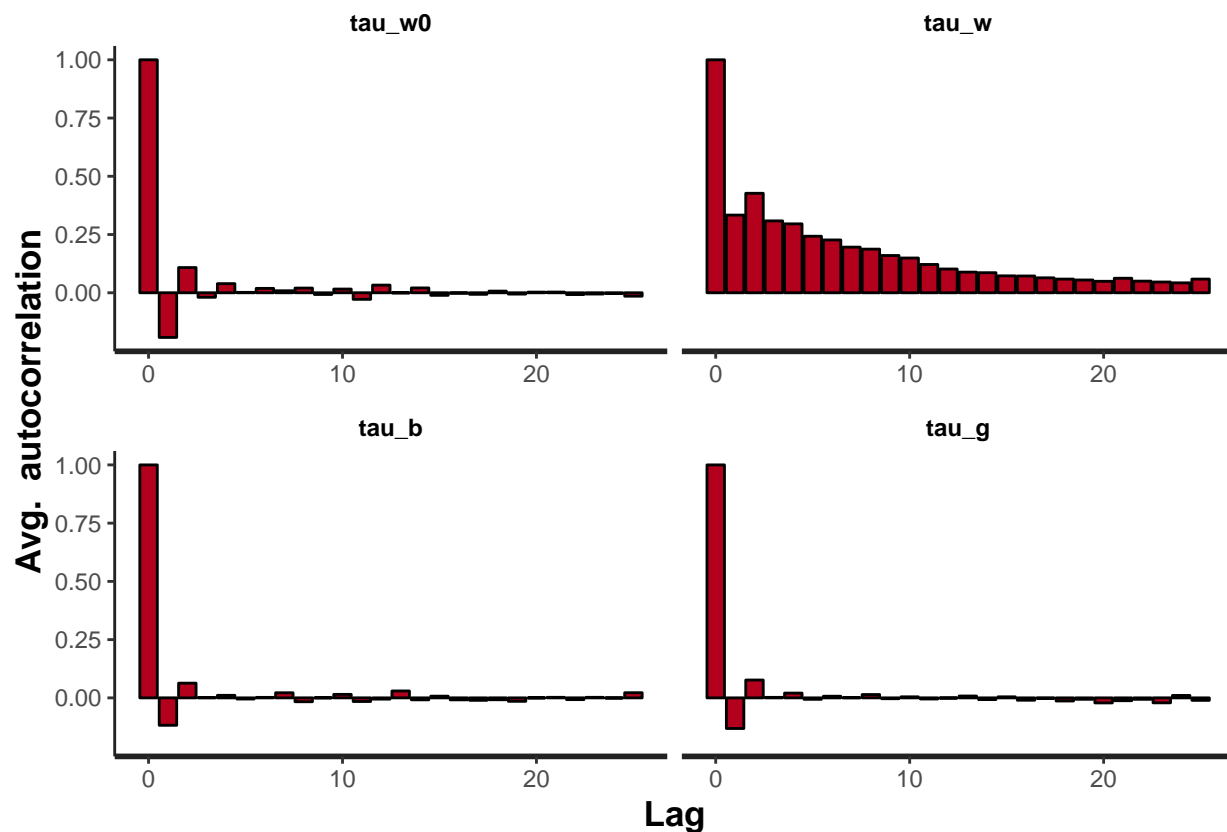
```
get_single_plots <- function(fit, param) {
  print(fit_summ[param,c(1,2,3,5,6,7,9,10)])
  print(stan_ac(fit, pars = param))
  print(rstan::traceplot(fit, pars = param))
}

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_single_plots(fit, beta)
  get_single_plots(fit, gamma)
  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 0.1410111 0.000588451 0.05376728 0.1020840 0.1344233 0.1706407
## tau_w  0.5180758 0.338449810 0.55722645 0.1894311 0.2725682 0.5589287
## tau_b  0.6253543 0.007734917 0.72165367 0.1443575 0.3848504 0.8342589
## tau_g  0.6323544 0.008211310 0.74882065 0.1423440 0.3708507 0.8410024
##           n_eff      Rhat
## tau_w0 8348.635152 1.0002662
## tau_w   2.710659 1.9346372
## tau_b 8704.550034 1.0000791
## tau_g 8316.311922 0.9999946
```

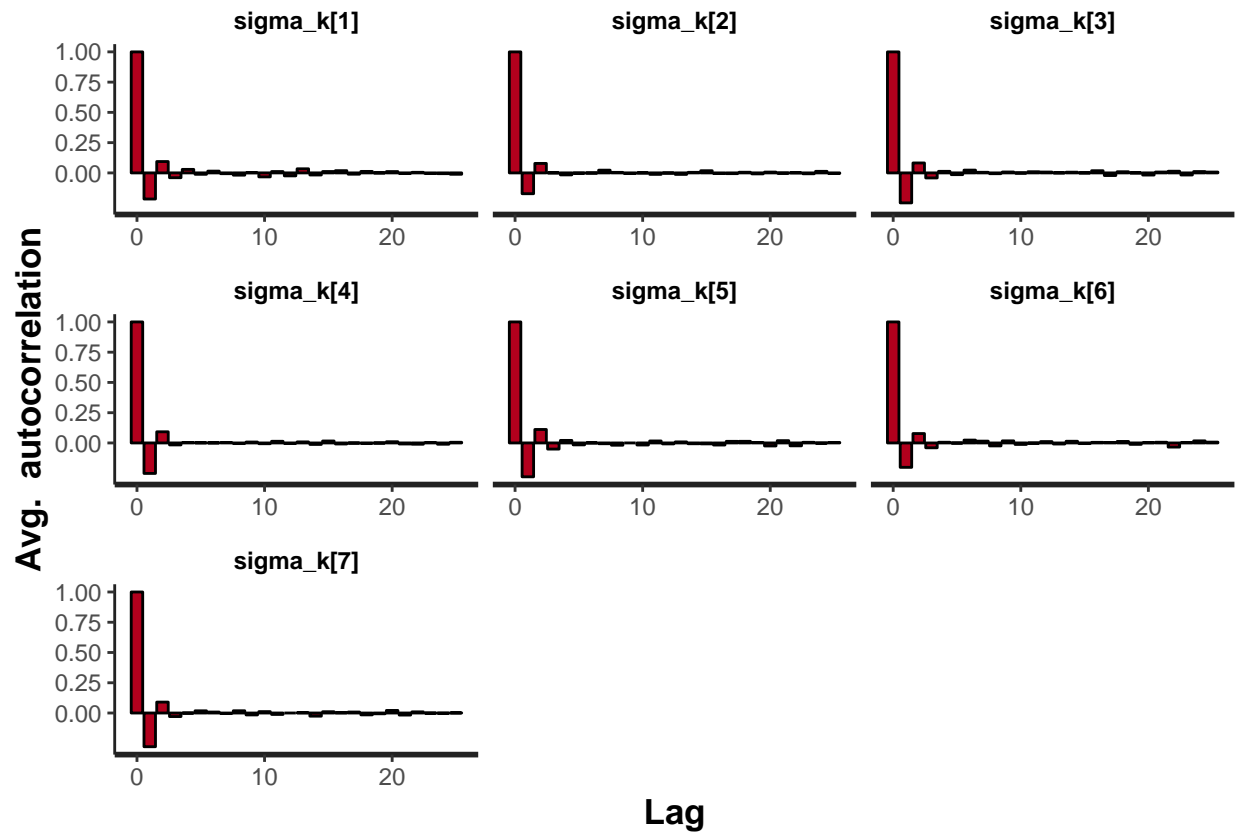


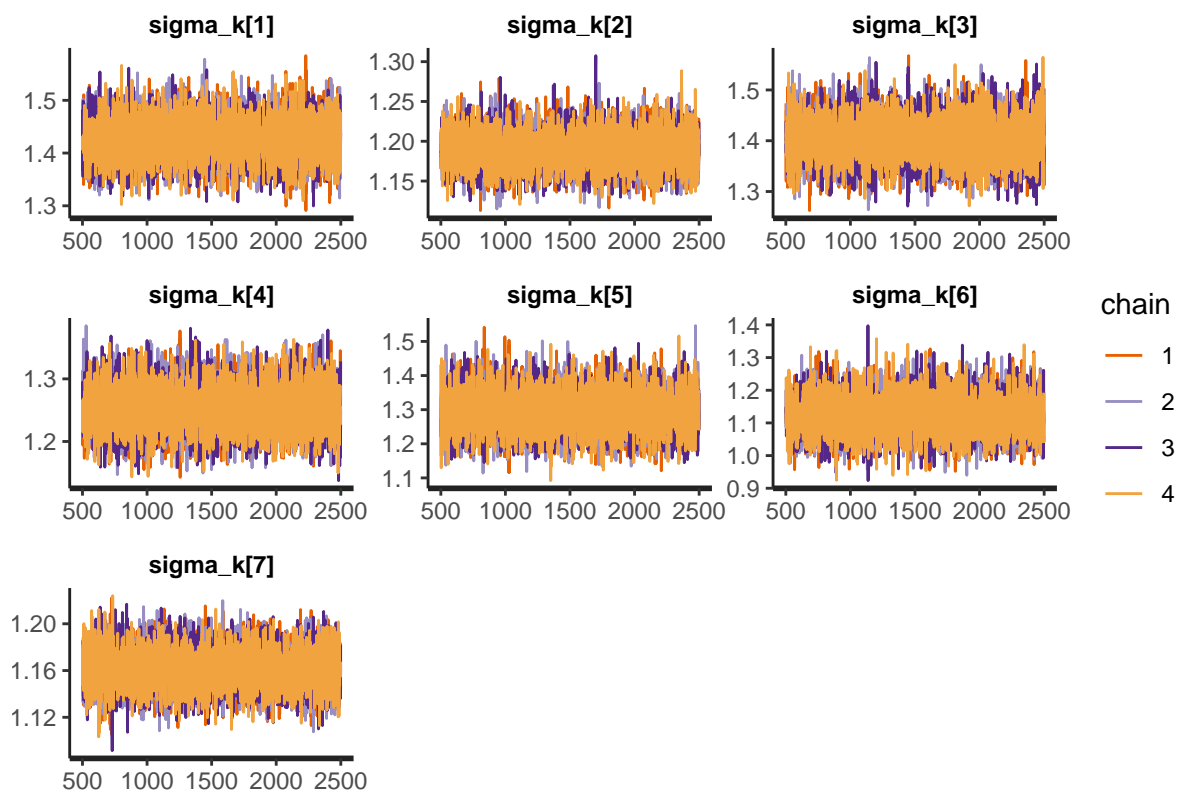
##		mean	se_mean	sd	25%	50%	75%
##	sigma_k[1]	1.424189	0.0003756499	0.03937820	1.396926	1.422744	1.450493
##	sigma_k[2]	1.190292	0.0002281104	0.02275204	1.175185	1.189888	1.205281

```

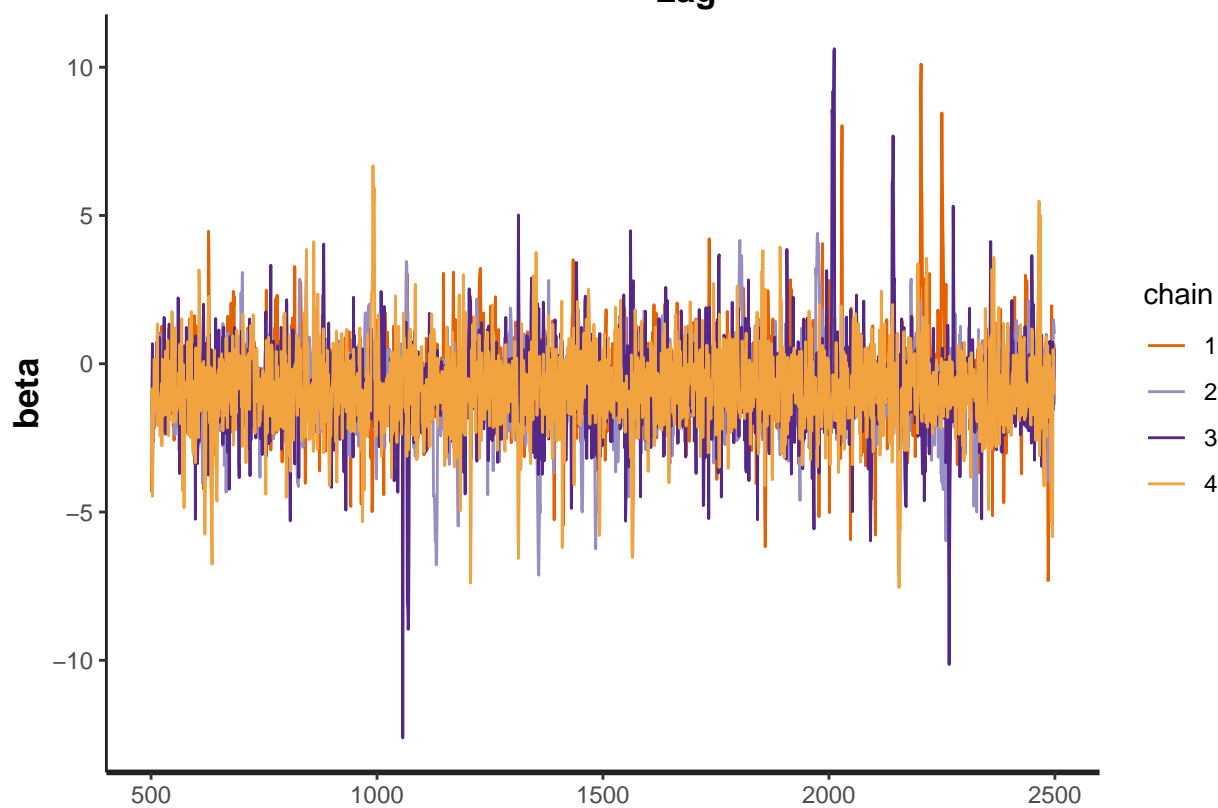
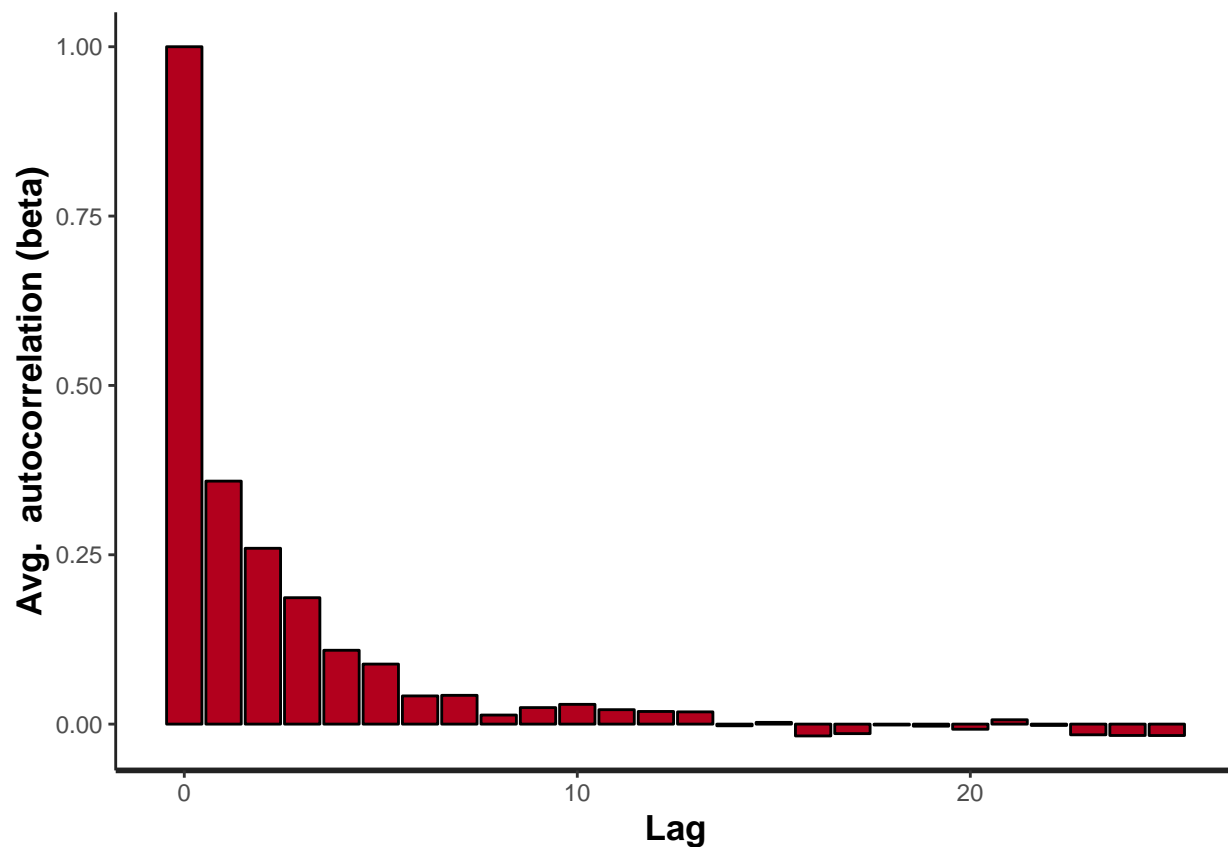
## sigma_k[3] 1.402294 0.0003602102 0.04199839 1.373805 1.401372 1.430304
## sigma_k[4] 1.252902 0.0003348217 0.03667452 1.227478 1.252592 1.277424
## sigma_k[5] 1.292363 0.0004878455 0.05817622 1.252902 1.290589 1.330022
## sigma_k[6] 1.119836 0.0005431913 0.05877402 1.079710 1.117845 1.156893
## sigma_k[7] 1.161273 0.0001519018 0.01734896 1.149255 1.161040 1.172794
##           n_eff      Rhat
## sigma_k[1] 10988.675 1.0000913
## sigma_k[2]  9948.338 1.0000636
## sigma_k[3] 13594.185 0.9997142
## sigma_k[4] 11997.800 0.9997262
## sigma_k[5] 14220.879 0.9996630
## sigma_k[6] 11707.525 0.9998177
## sigma_k[7] 13044.312 0.9997873

```



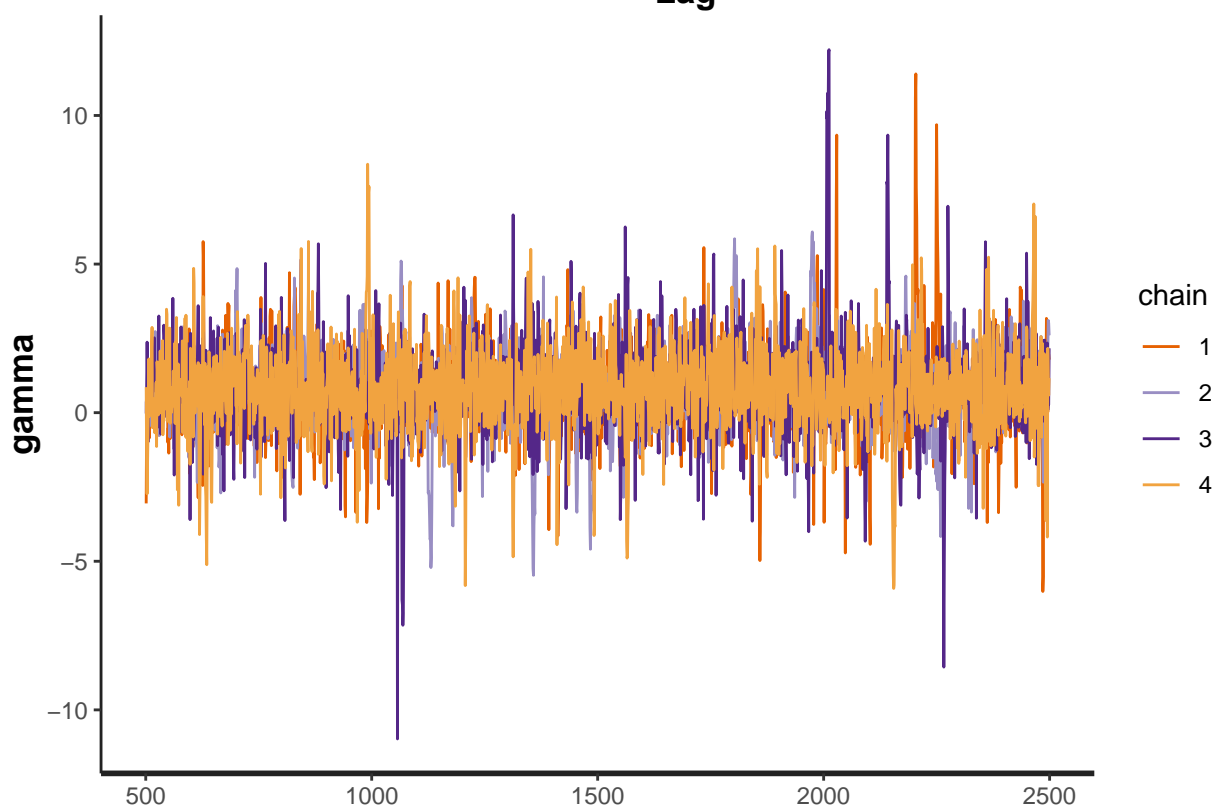
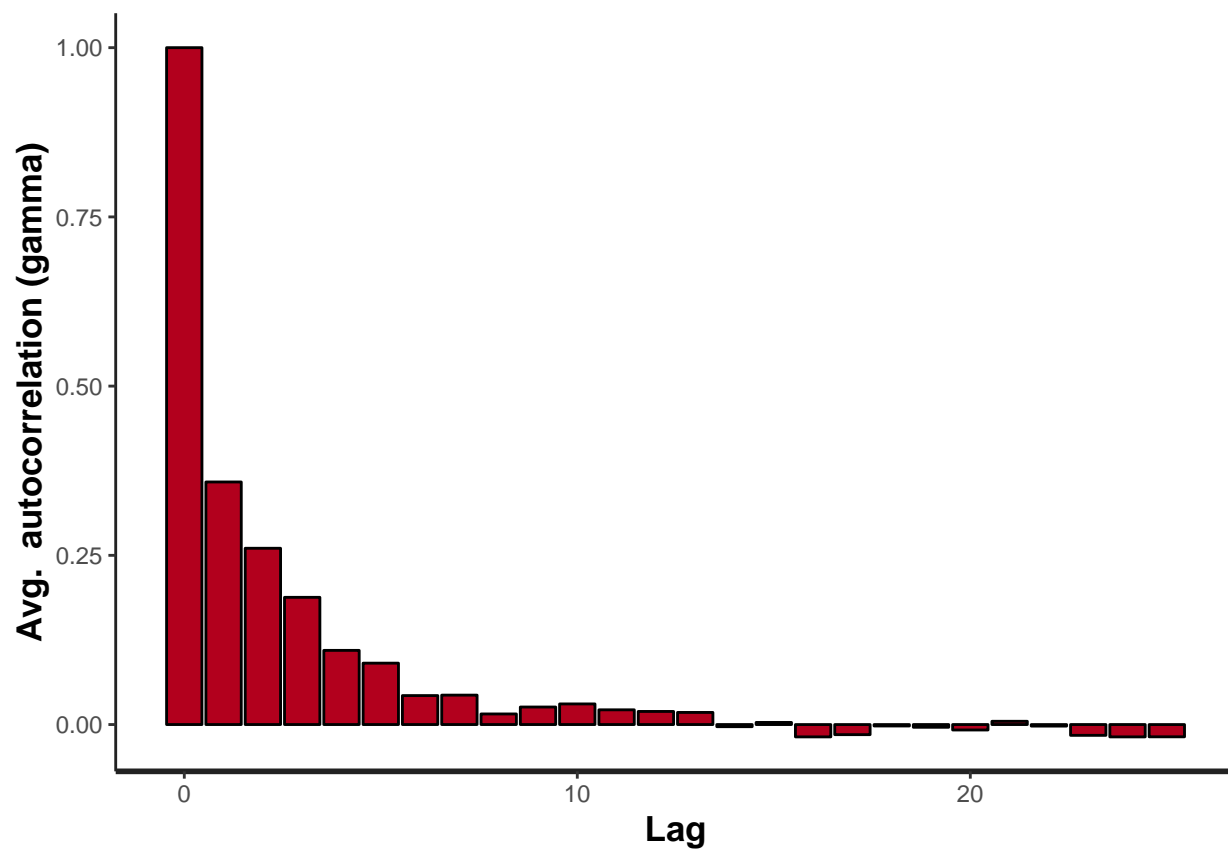


```
##           mean    se_mean      sd      25%      50%      75%
## beta -0.788546  0.03016948  1.44301 -1.584791 -0.7911441 -0.009520593
##           n_eff      Rhat
## beta  2287.72  1.004267
```

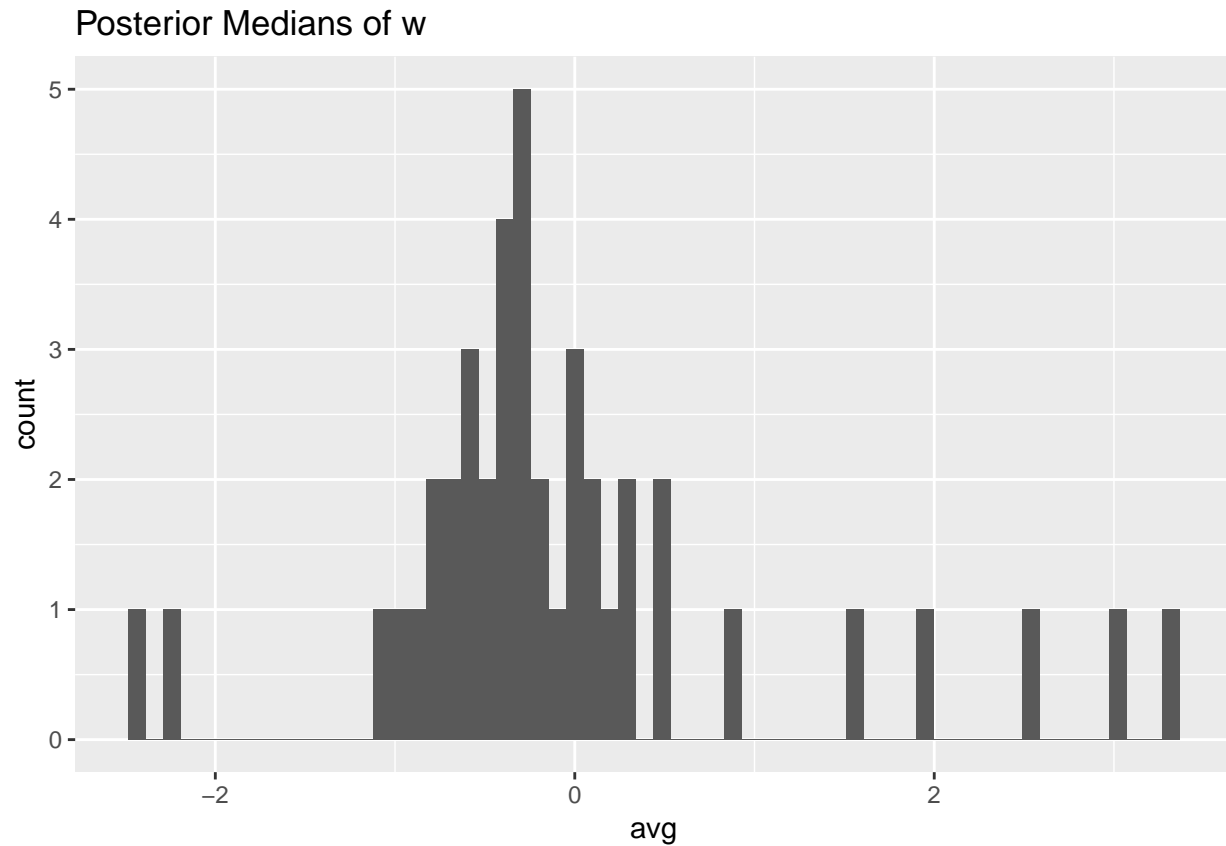


##	mean	se_mean	sd	25%	50%	75%	n_eff
## gamma	0.7755348	0.02957144	1.439456	-0.01470983	0.7640935	1.54891	2369.475

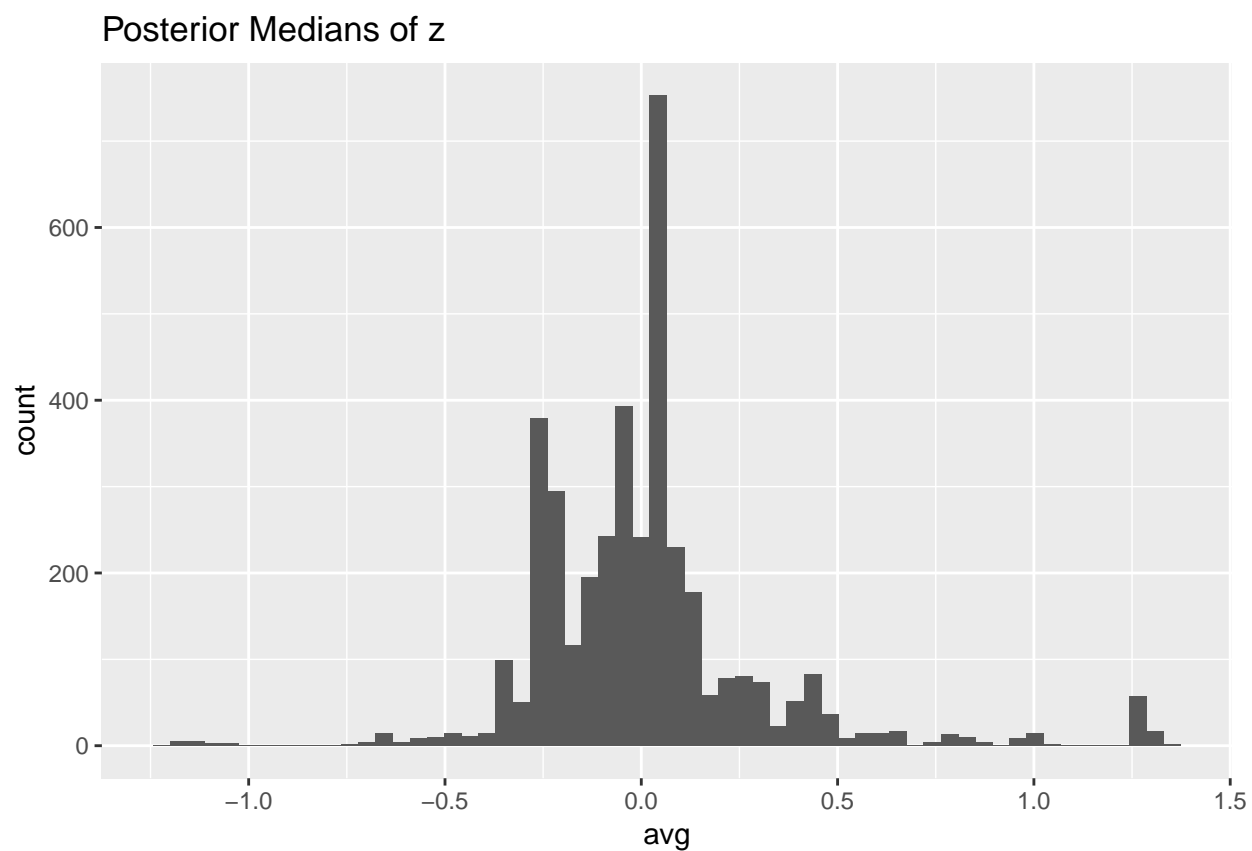
```
##           Rhat
## gamma 1.001728
```




```
## [1] "Summary statistics for posterior medians of w"
##      avg
##  Min.   :-2.41763
## 1st Qu. :-0.58061
## Median :-0.30037
## Mean   :-0.04018
## 3rd Qu. : 0.13570
## Max.    : 3.33673
```



```
## [1] "Summary statistics for posterior medians of z"
##      avg
##  Min.   :-1.218400
## 1st Qu. :-0.166595
## Median : 0.001317
## Mean   : 0.012617
## 3rd Qu. : 0.077294
## Max.    : 1.354984
```



```
## [1] "Summary statistics for posterior medians of p"
##      avg
##  Min.   :-9.7980
## 1st Qu.: -5.5398
##  Median :-4.5312
##   Mean  :-4.4901
## 3rd Qu.: -3.4325
##   Max.   :-0.8439
```

