

MCMC Diagnostics - IFLS data

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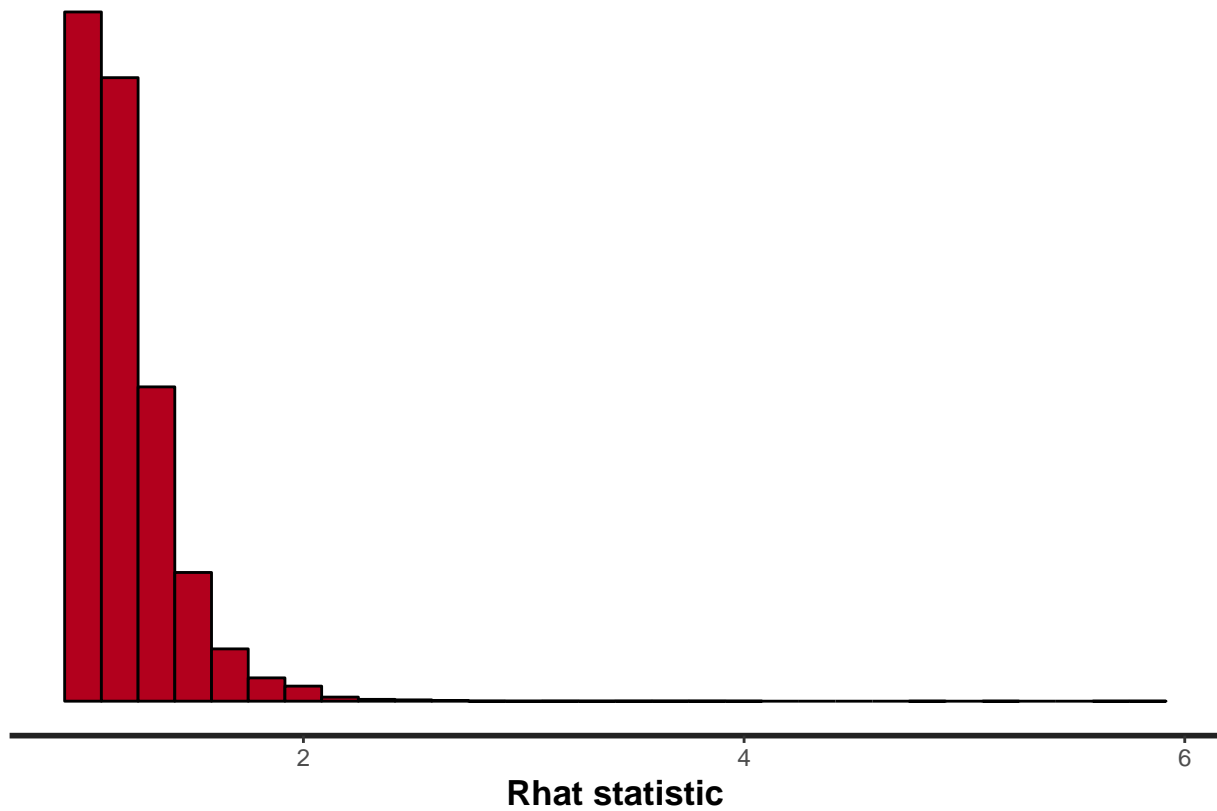
04/28/2020

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

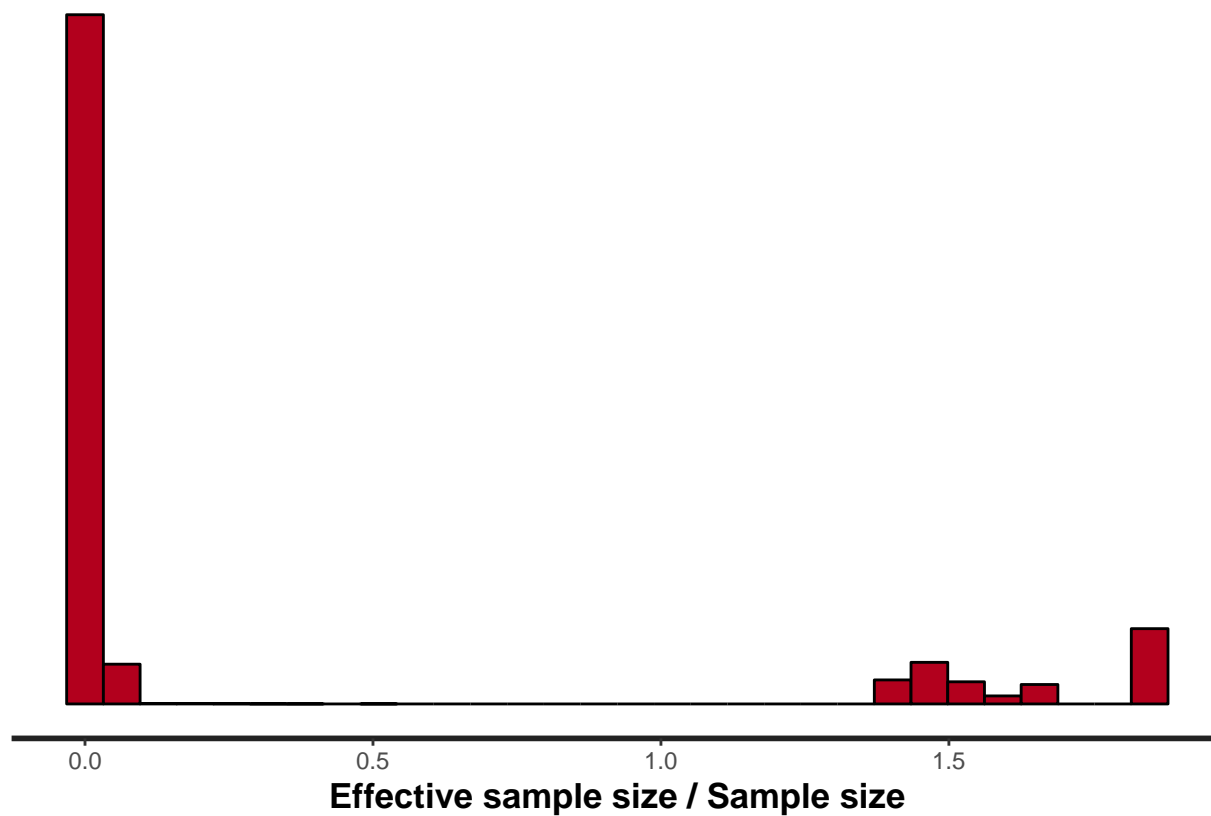
General MCMC diagnostic plots

Overall model diagnostics from rstan package.

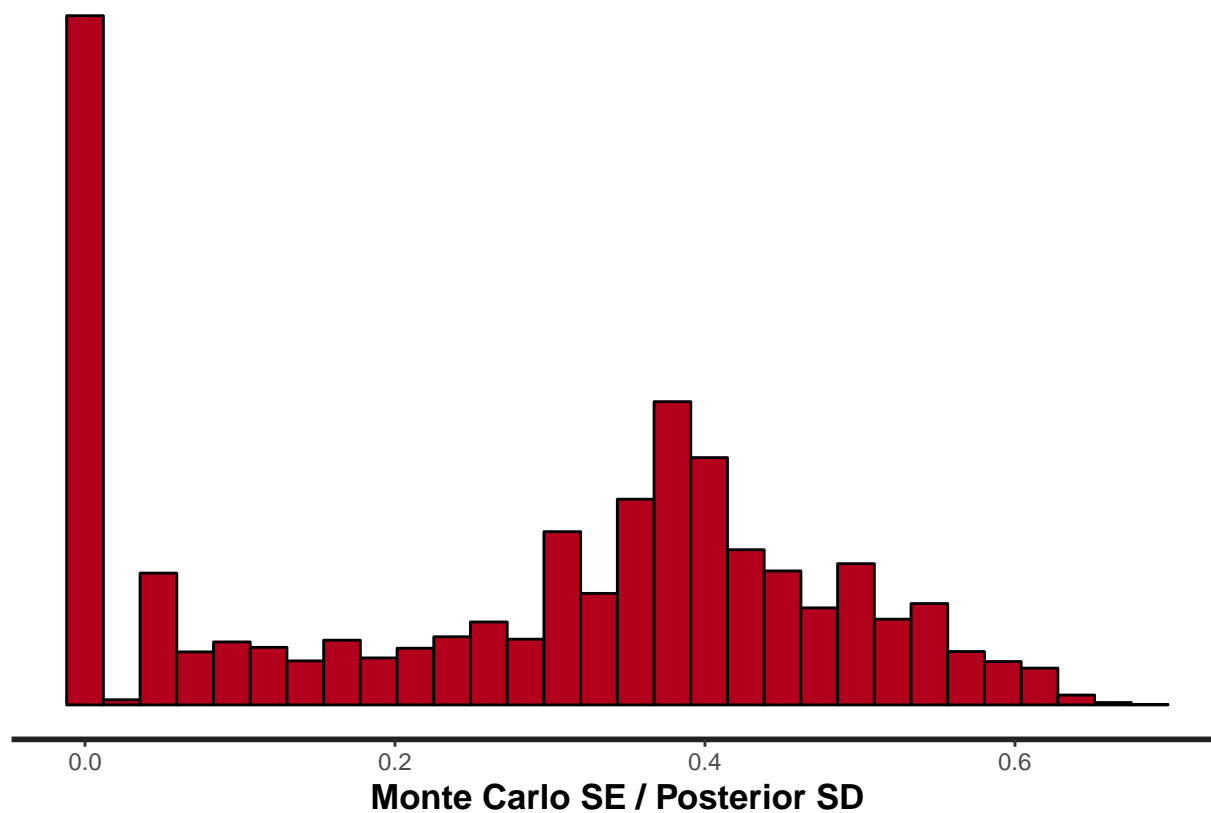
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



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```
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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))
}

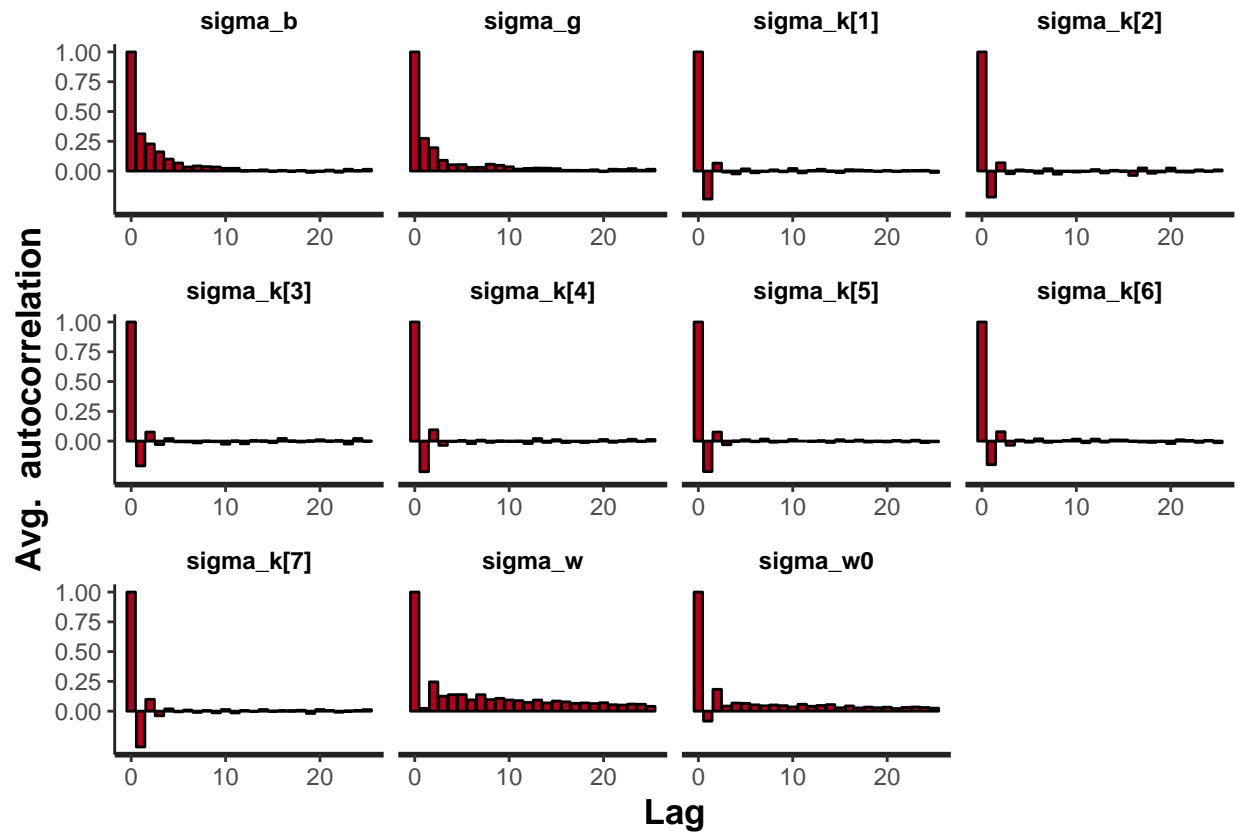
get_aggreg_plots <- function(fit, param, trim = F, trim_amount) {
  ind <- grep(paste0("^",param), rownames(as.data.frame(summary(fit)$summary)))
  medians <- data.frame(avg = as.data.frame(summary(fit)$summary)$`50%`[ind])
  print(paste0("Summary statistics for posterior medians of ",param))
  print(summary(medians))
  title <- paste0("Posterior Medians of ",param)
  print(ggplot(medians, aes(x = avg)) + geom_histogram(bins = 60) + ggtitle(title))
  if (trim == T) {
    lim <- quantile(abs(medians$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),"%")))
  }
}

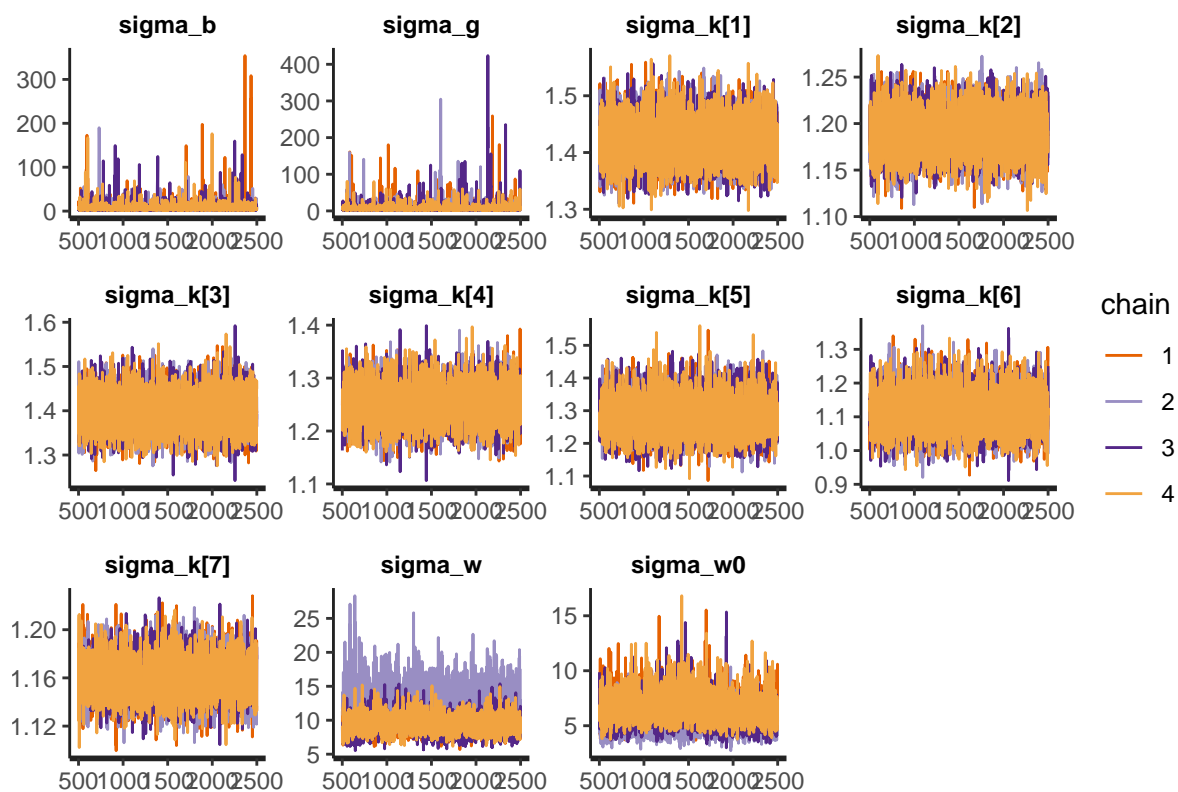
plot_fit <- function(fit) {
  get_single_plots(fit, sigma_params)
  get_single_plots(fit, beta)
  get_single_plots(fit, gamma)
  get_aggreg_plots(fit, "w")
  get_aggreg_plots(fit, "z")
  get_aggreg_plots(fit, "p")
}

plot_fit(fit)
```

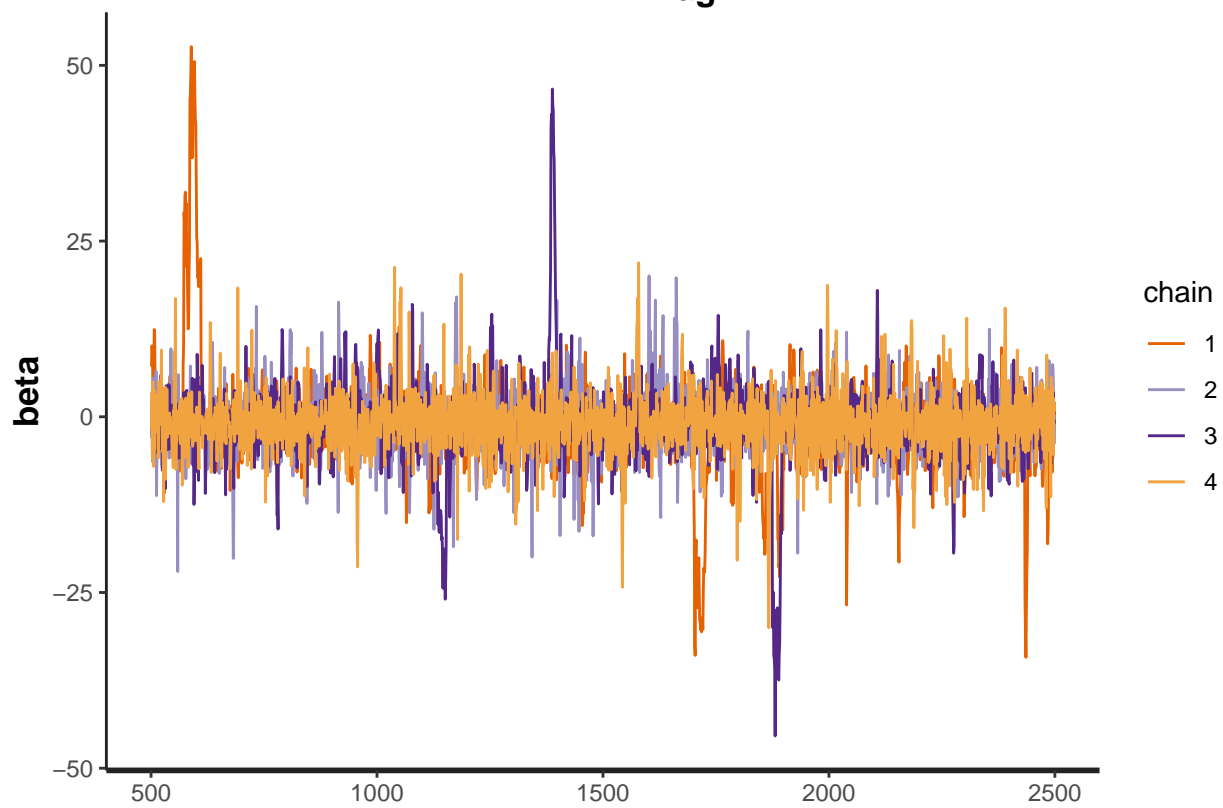
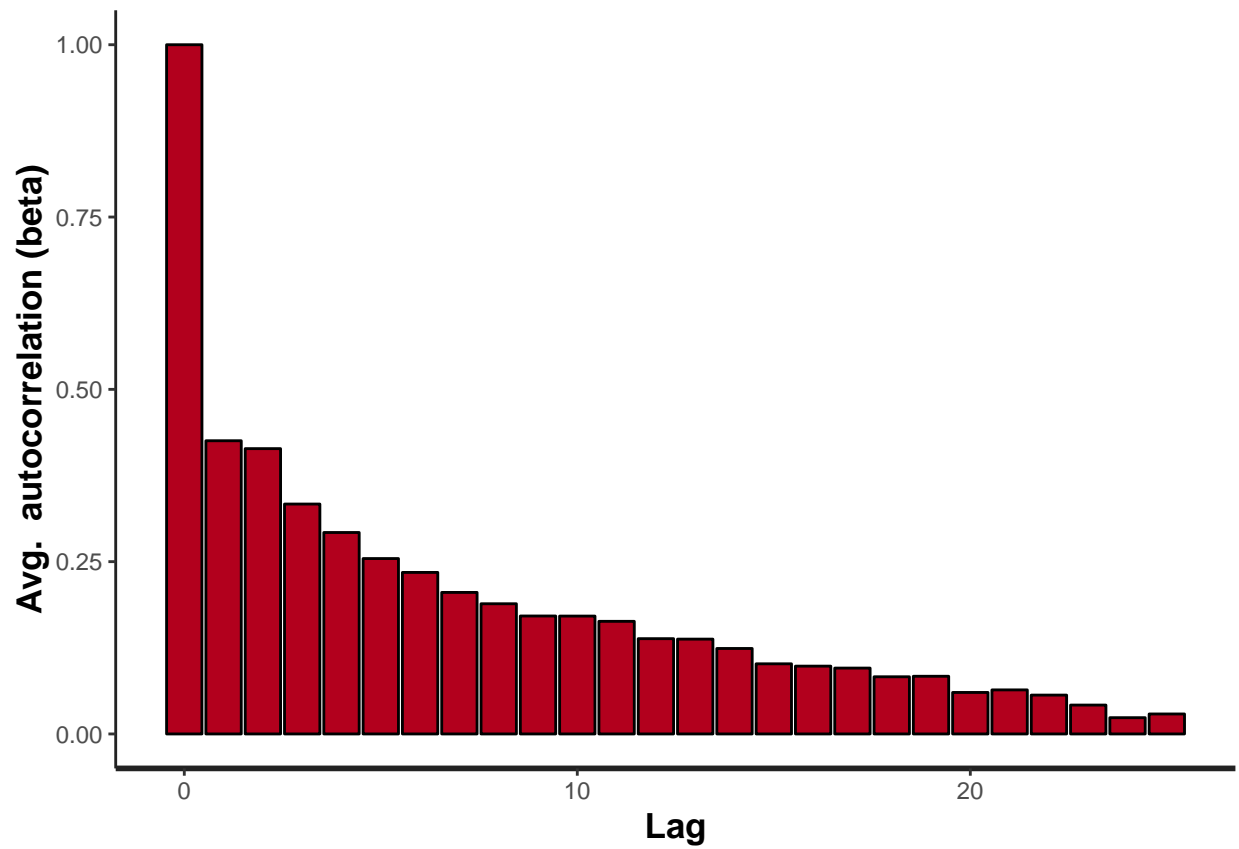
##		mean	se_mean	sd	25%	50%	75%
##	sigma_b	8.314664	0.2918638496	12.81391537	3.545753	5.264778	8.688576
##	sigma_g	8.357811	0.2906642964	13.28265065	3.568838	5.234731	8.536570
##	sigma_k[1]	1.422215	0.0003398700	0.03794483	1.395131	1.421367	1.448125
##	sigma_k[2]	1.189243	0.0002134336	0.02320545	1.173678	1.189065	1.204595
##	sigma_k[3]	1.398187	0.0003944494	0.04203025	1.369180	1.397122	1.425761
##	sigma_k[4]	1.250496	0.0003116472	0.03609410	1.225386	1.249602	1.274763
##	sigma_k[5]	1.285736	0.0005065962	0.05768392	1.246474	1.283710	1.322412
##	sigma_k[6]	1.113591	0.0005490045	0.05870945	1.072902	1.111252	1.150320
##	sigma_k[7]	1.160930	0.0001376492	0.01674052	1.149855	1.160902	1.171844
##	sigma_w	10.433608	1.4439786089	2.60067841	8.586274	9.765307	11.620508
##	sigma_w0	6.093449	0.4363687010	1.42587796	5.099852	5.894089	6.884969
##		n_eff	Rhat				
##	sigma_b	1927.538628	1.0026289				
##	sigma_g	2088.267469	1.0018472				
##	sigma_k[1]	12464.634787	0.9999229				
##	sigma_k[2]	11821.003498	0.9997961				
##	sigma_k[3]	11353.801207	0.9998636				
##	sigma_k[4]	13413.622737	0.9999199				
##	sigma_k[5]	12965.392338	0.9998369				

```
## sigma_k[6] 11435.736398 1.0002203
## sigma_k[7] 14790.743961 0.9996603
## sigma_w      3.243783 1.5827018
## sigma_w0     10.677204 1.1183971
```



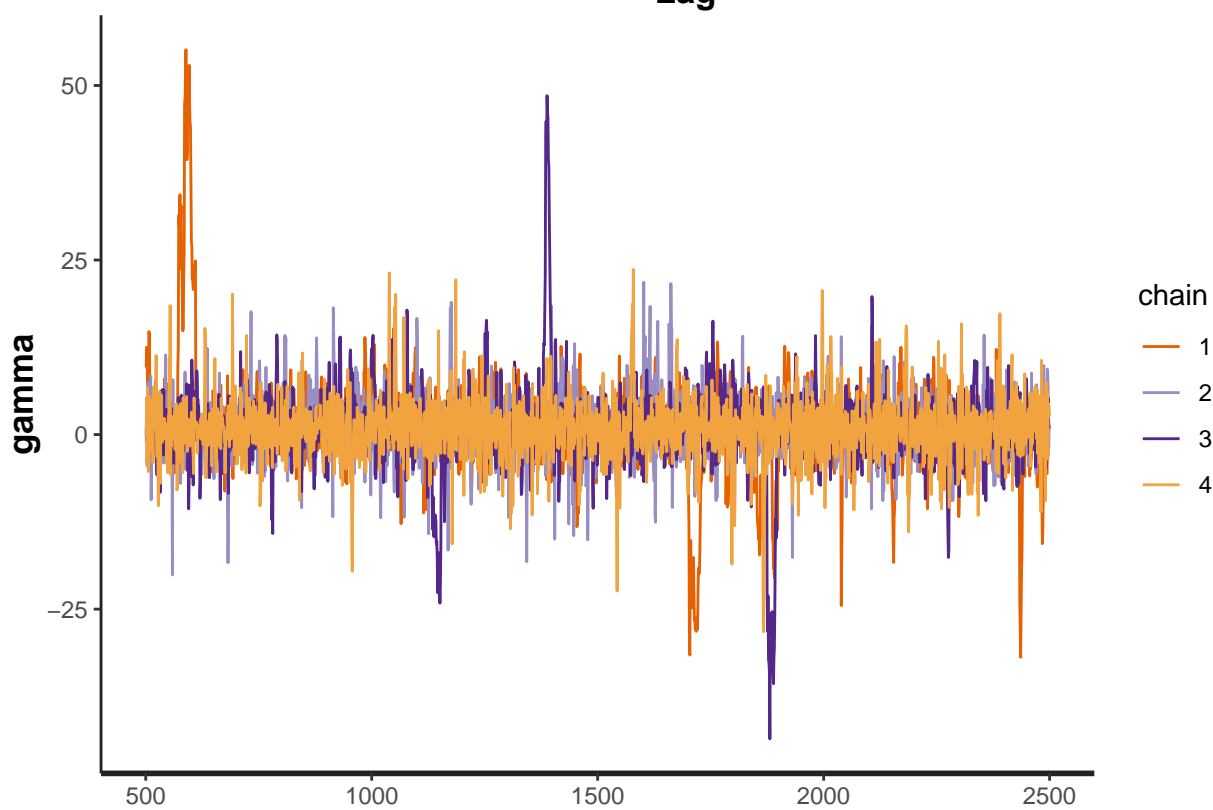
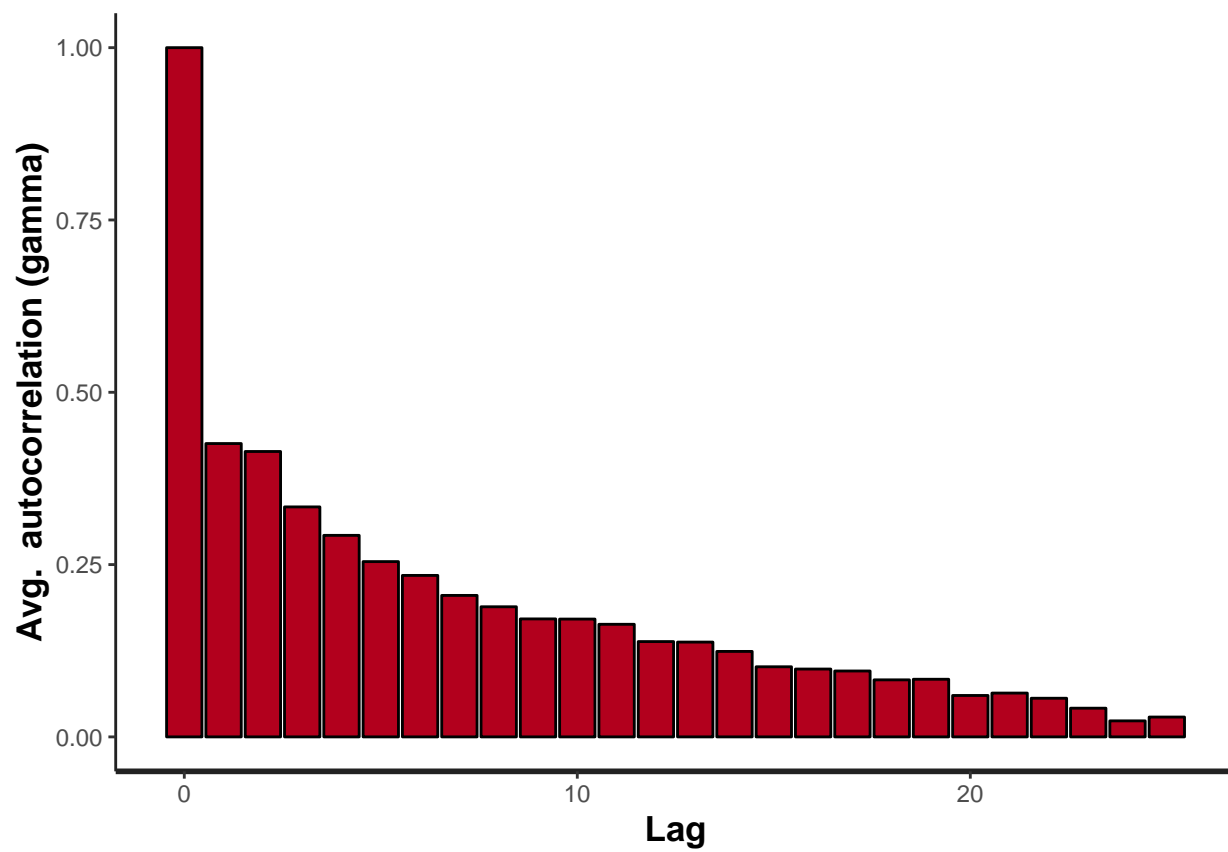


```
##           mean    se_mean      sd    25%    50%    75%   n_eff
## beta -0.9594464  0.2250137  5.621688 -3.297915 -0.9017284  1.34763  624.1884
##           Rhat
## beta  1.009121
```

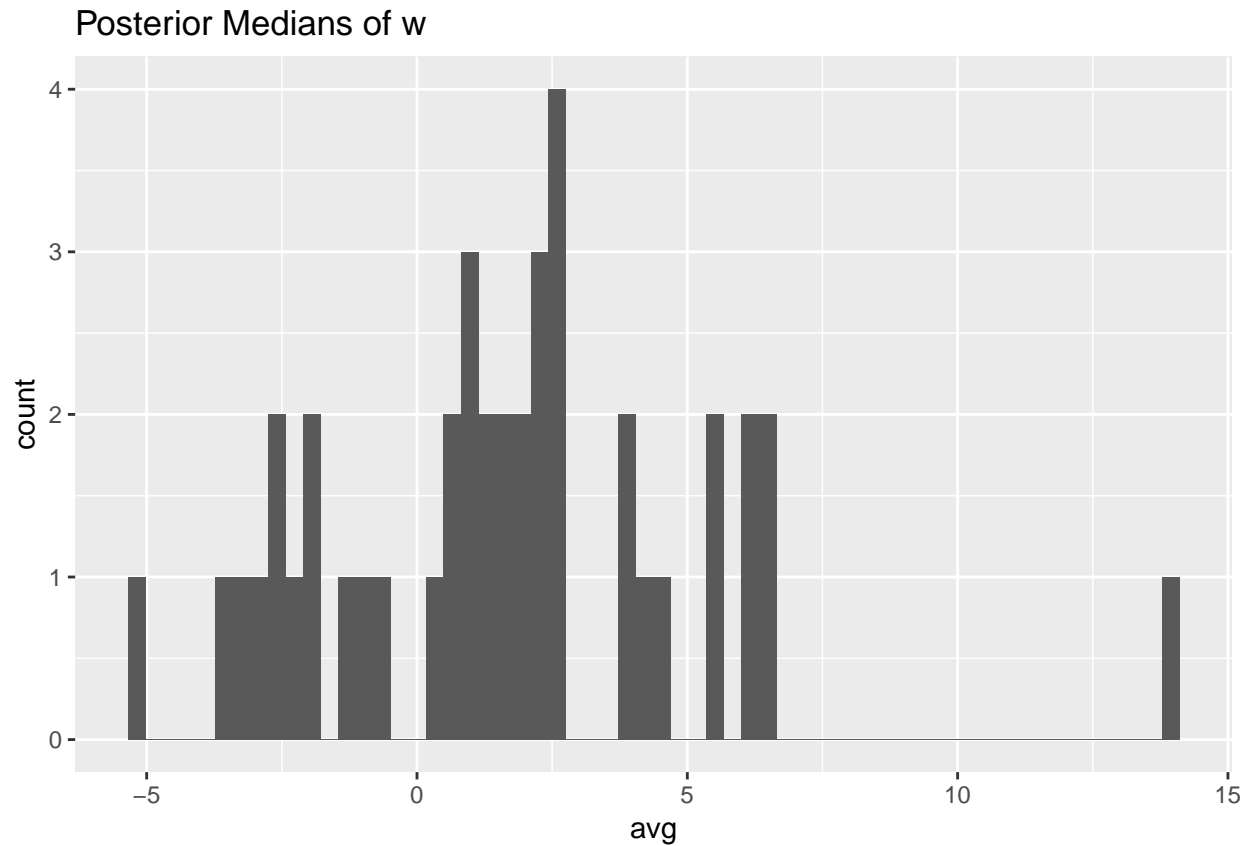


```
##          mean    se_mean      sd    25%    50%    75%   n_eff
## gamma  1.000092  0.2243963  5.621332 -1.332968  1.030715  3.295308  627.5484
```

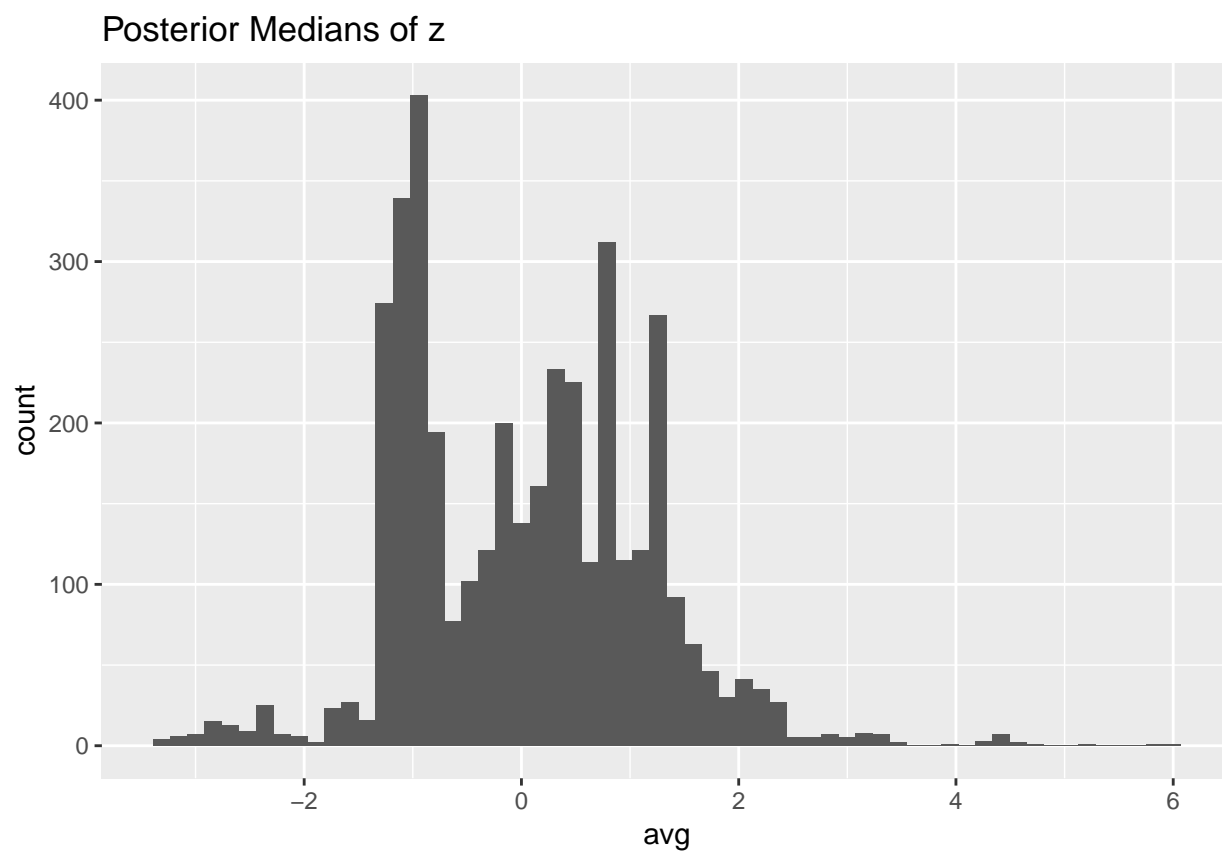
```
##           Rhat
## gamma 1.008929
```



```
## [1] "Summary statistics for posterior medians of w"
##      avg
##  Min.   :-5.199
## 1st Qu. :-0.977
## Median  : 1.765
## Mean    : 1.648
## 3rd Qu. : 3.582
## Max.    :13.930
```



```
## [1] "Summary statistics for posterior medians of z"
##      avg
##  Min.   :-3.35862
## 1st Qu. :-0.91178
## Median  : 0.04142
## Mean    : 0.03025
## 3rd Qu. : 0.79647
## Max.    : 5.94238
```

```
## [1] "Summary statistics for posterior medians of p"
##      avg
##  Min.   :-23.920
## 1st Qu. :-13.227
## Median :-11.304
## Mean    :-11.375
## 3rd Qu.  -9.213
## Max.     -3.513
```

