Beta_p estimations vs rq() coefficients on NMES1988

```
response = NMES1988[,1]   # Number of physician office visits.
dat = NMES1988[c(8,11,15,16)] # Remove the responses

# Center and scale the continuous predictors:
# dat[c(2,4)]= scale(dat[c(2,4)])
```

NMES1988 Dataset

The data was sourced from US National Medical Expenditure Survey [NMES] data for 1987/88. Available as NMES1988 in package AER (Kleiber and Zeileis 2008). Originally taken from Deb and Trivedi (J. Applied Econometrics 1997)

```
head(NMES1988)
```

```
##   visits nvisits ovisits novisits emergency hospital  health chronic     adl
## 1      5       0       0        0         0        1 average       2  normal
## 2      1       0       2        0         2        0 average       2  normal
## 3     13       0       0        0         3        3    poor       4 limited
## 4     16       0       5        0         1        1    poor       2 limited
## 5      3       0       0        0         0        0 average       2 limited
## 6     17       0       0        0         0        0    poor       5 limited
##   region age afam gender married school income employed insurance medicaid
## 1  other 6.9  yes   male     yes      6 2.8810      yes       yes       no
## 2  other 7.4   no female     yes     10 2.7478       no       yes       no
## 3  other 6.6  yes female      no     10 0.6532       no        no      yes
## 4  other 7.6   no   male     yes      3 0.6588       no       yes       no
## 5  other 7.9   no female     yes      6 0.6588       no       yes       no
## 6  other 6.6   no female      no      7 0.3301       no        no      yes
```

Model: visits ~ chronic+age+school+income

Quantreg

```
rqfit <- rq(visits ~ chronic+age+school+income, data = NMES1988, tau = quantiles)
summary(rqfit)
```

```
## Warning in summary.rq(xi, U = U, ...): 574 non-positive fis
```

```
## Warning in summary.rq(xi, U = U, ...): 2 non-positive fis
```

```
##
## Call: rq(formula = visits ~ chronic + age + school + income, tau = quantiles,
##     data = NMES1988)
##
## tau: [1] 0.1
##
## Coefficients:
##             Value    Std. Error t value  Pr(>|t|)
## (Intercept) -0.40446  0.09906   -4.08313  0.00005
## chronic      0.29194  0.05954    4.90356  0.00000
## age          0.00241  0.01155    0.20898  0.83447
## school       0.03137  0.00510    6.15005  0.00000
## income       0.00293  0.00574    0.51049  0.60973
##
## Call: rq(formula = visits ~ chronic + age + school + income, tau = quantiles,
##     data = NMES1988)
##
## tau: [1] 0.5
##
## Coefficients:
##             Value    Std. Error t value  Pr(>|t|)
## (Intercept) -0.74876  1.08309   -0.69132  0.48940
## chronic      1.29989  0.07743   16.78833  0.00000
## age          0.17502  0.13866    1.26220  0.20694
## school       0.15941  0.02418    6.59318  0.00000
## income      -0.02093  0.01744   -1.20012  0.23016
##
## Call: rq(formula = visits ~ chronic + age + school + income, tau = quantiles,
##     data = NMES1988)
##
## tau: [1] 0.9
##
## Coefficients:
##             Value    Std. Error t value  Pr(>|t|)
## (Intercept)  8.60228  2.75499    3.12243  0.00181
## chronic      2.14704  0.19510   11.00477  0.00000
## age         -0.01382  0.34202   -0.04040  0.96778
## school       0.09863  0.05931    1.66307  0.09637
## income      -0.03130  0.04239   -0.73845  0.46028
```

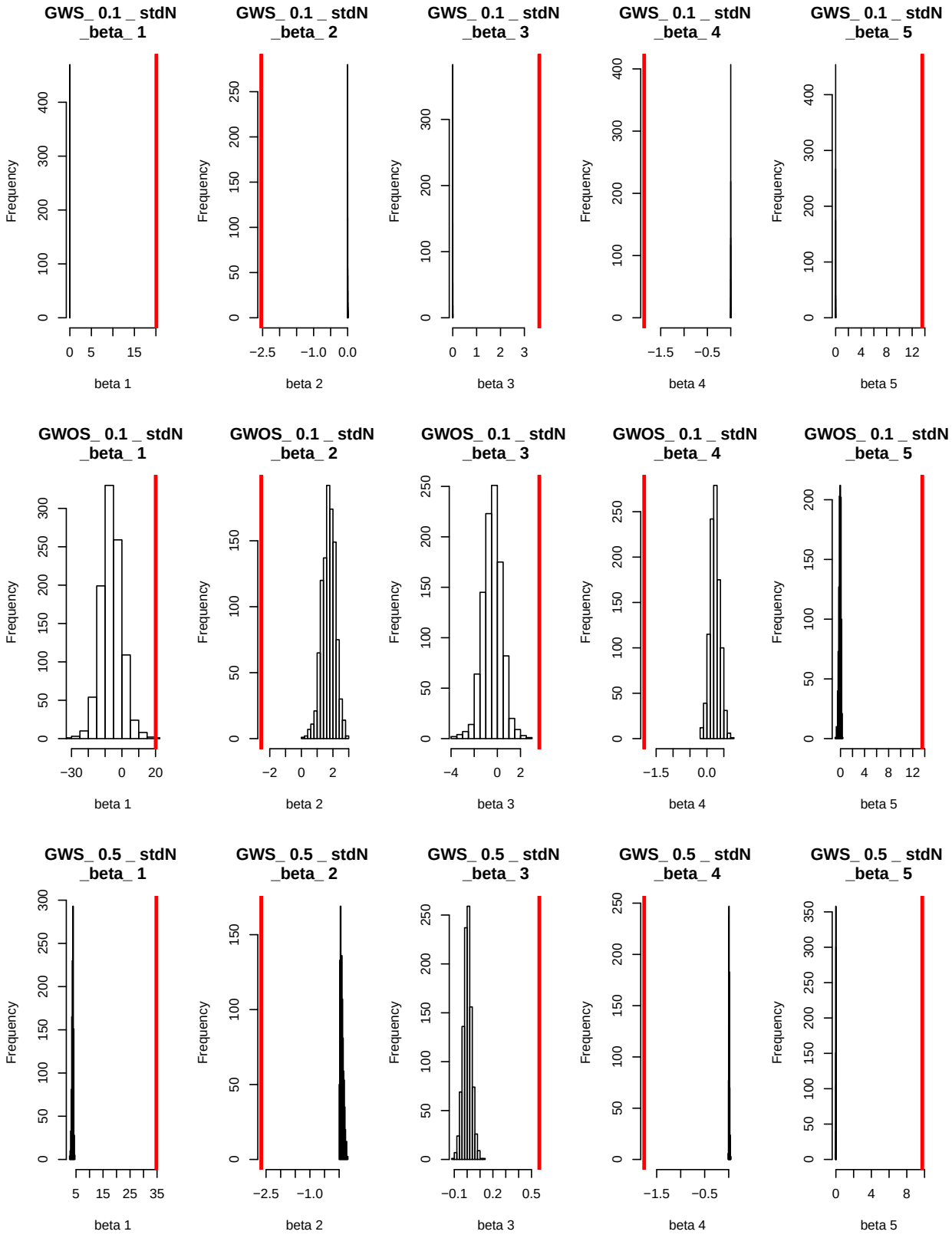
Beta_p estimations vs rq() coefficients

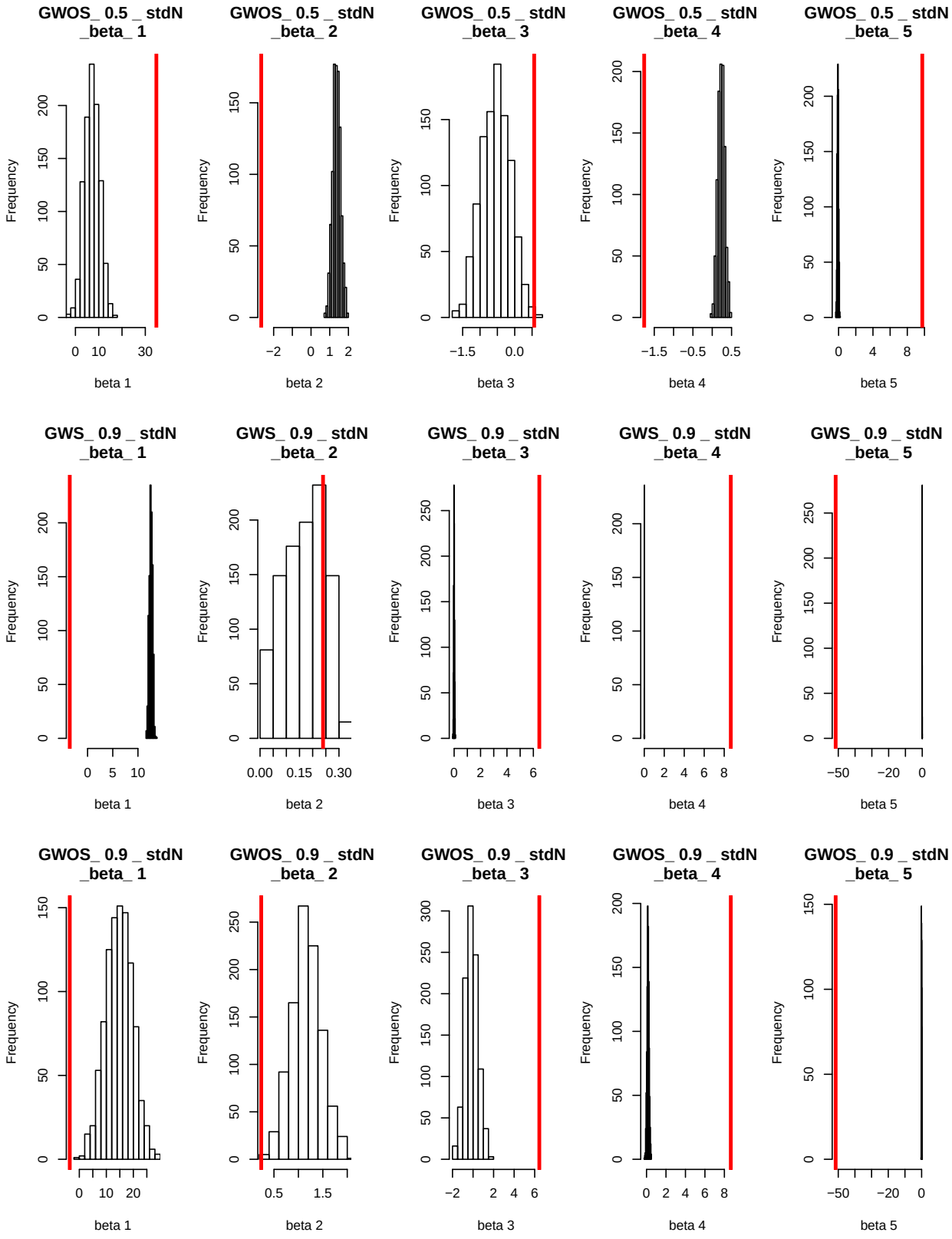
The plot titles are formatted as (sampling method)*(quantile)*(error distribution)_(beta_p). The histograms are the beta_p estimations yielded by the paper's model. The red horizontal line reflects rq() beta coefficients. The absence of red lines in some plots reflects big difference in our beta_p estimations and the rq() results.

Notations:

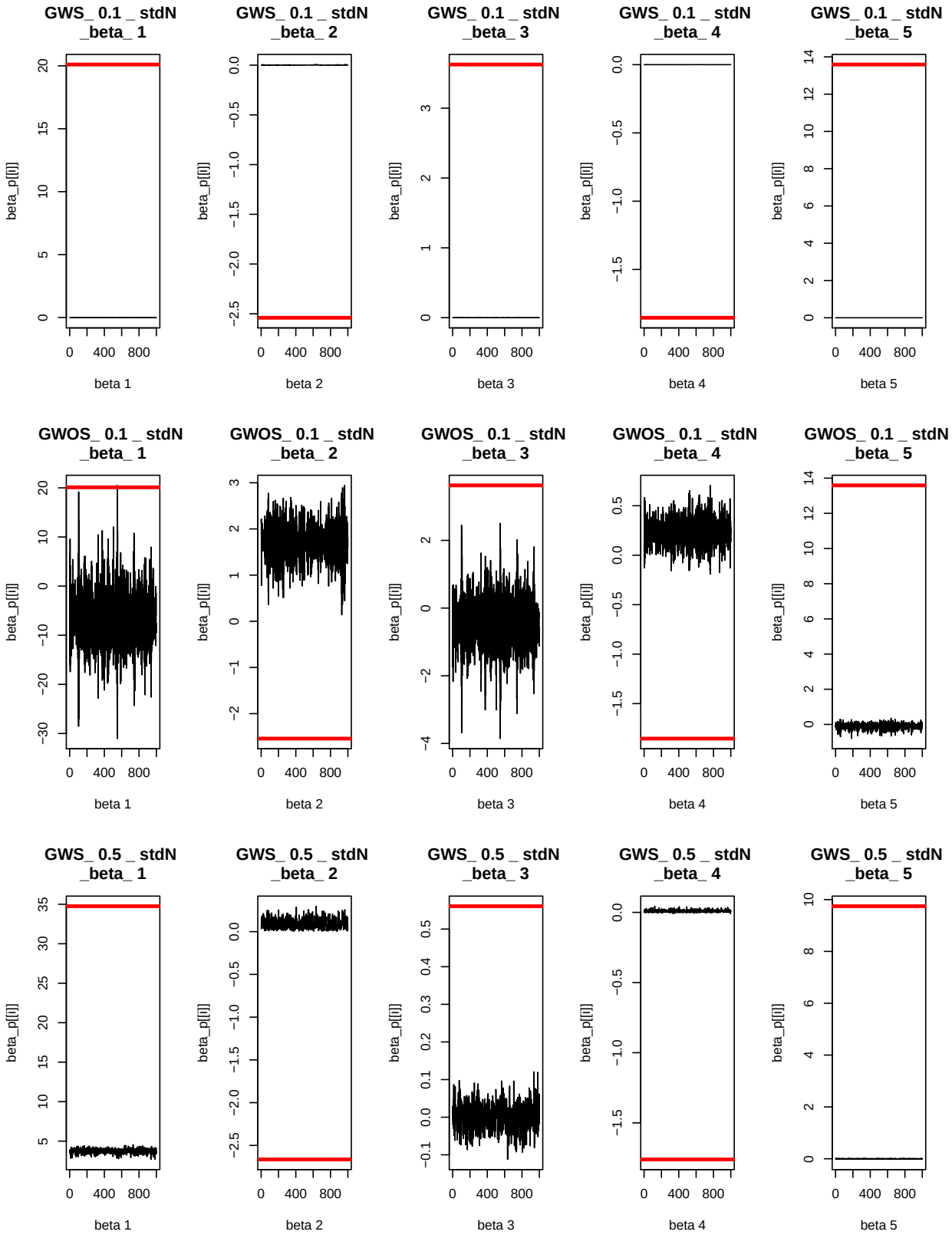
GWS: Gibbs sampler of the asymmetric Laplace distribution (ALD) with Scale parameter
GWOS: Gibbs sampler of the asymmetric Laplace distribution (ALD) without Scale parameter
stdN: Standard Normal Prior
beta_1: Intercept
beta_2: Regression coefficient associated with chronic
beta_3: Regression coefficient associated with age
beta_4: Regression coefficient associated with school
beta_5: Regression coefficient associated with income

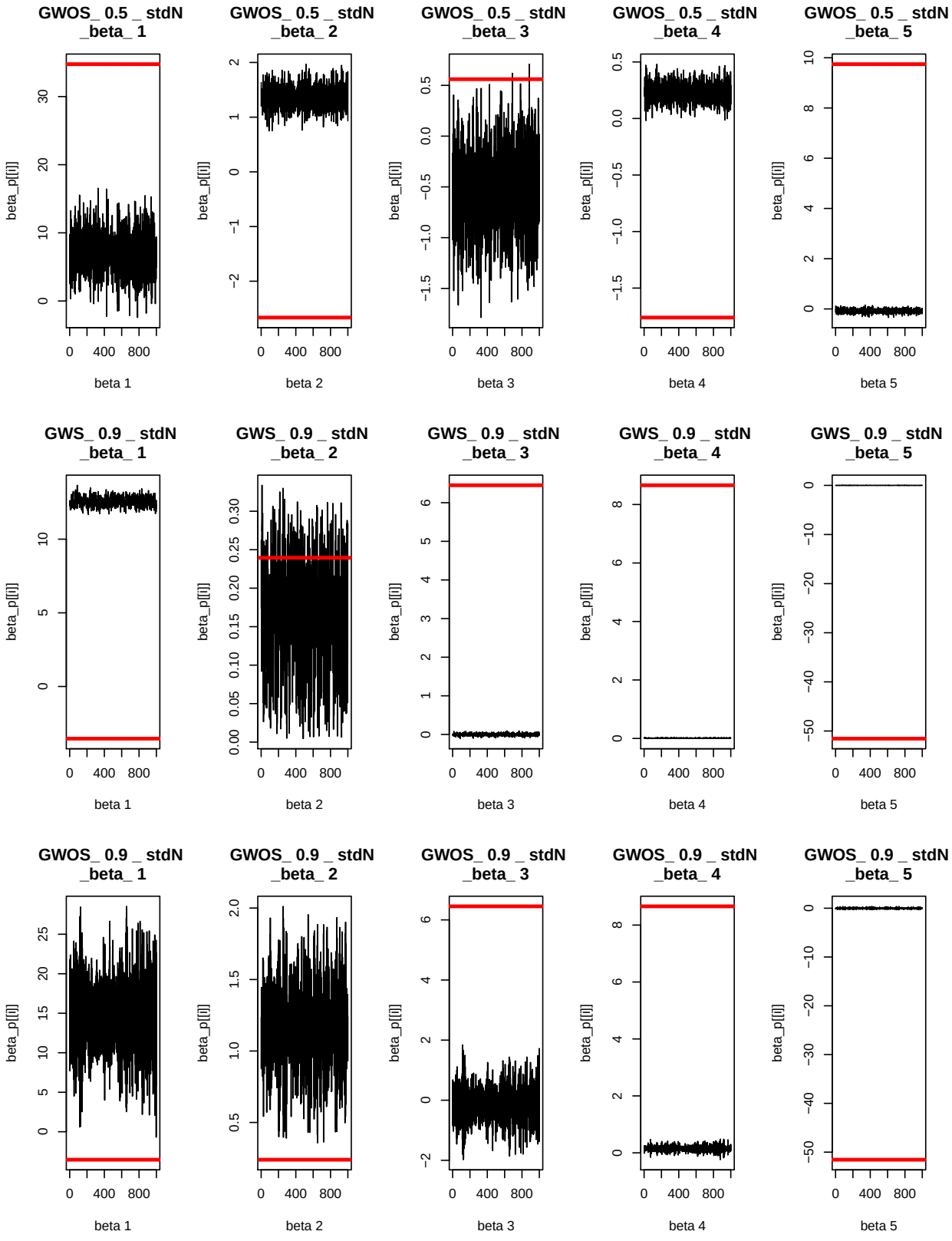
Histograms


GWS_ 0.1 _ stdN _beta_ 1
GWS_ 0.1 _ stdN _beta_ 2
GWS_ 0.1 _ stdN _beta_ 3
GWS_ 0.1 _ stdN _beta_ 4
GWS_ 0.1 _ stdN _beta_ 5
GWOS_ 0.1 _ stdN _beta_ 1
GWOS_ 0.1 _ stdN _beta_ 2
GWOS_ 0.1 _ stdN _beta_ 3
GWOS_ 0.1 _ stdN _beta_ 4
GWOS_ 0.1 _ stdN _beta_ 5
GWS_ 0.5 _ stdN _beta_ 1
GWS_ 0.5 _ stdN _beta_ 2
GWS_ 0.5 _ stdN _beta_ 3
GWS_ 0.5 _ stdN _beta_ 4
GWS_ 0.5 _ stdN _beta_ 5
Frequency
beta 1
beta 2
beta 3
beta 4
beta 5


GWOS_ 0.5 _ stdN _beta_ 1
GWOS_ 0.5 _ stdN _beta_ 2
GWOS_ 0.5 _ stdN _beta_ 3
GWOS_ 0.5 _ stdN _beta_ 4
GWOS_ 0.5 _ stdN _beta_ 5
GWS_ 0.9 _ stdN _beta_ 1
GWS_ 0.9 _ stdN _beta_ 2
GWS_ 0.9 _ stdN _beta_ 3
GWS_ 0.9 _ stdN _beta_ 4
GWS_ 0.9 _ stdN _beta_ 5
GWOS_ 0.9 _ stdN _beta_ 1
GWOS_ 0.9 _ stdN _beta_ 2
GWOS_ 0.9 _ stdN _beta_ 3
GWOS_ 0.9 _ stdN _beta_ 4
GWOS_ 0.9 _ stdN _beta_ 5
Frequency
beta 1
beta 2
beta 3
beta 4
beta 5

Traceplots


GWS_ 0.1 _ stdN _beta_ 1
GWS_ 0.1 _ stdN _beta_ 2
GWS_ 0.1 _ stdN _beta_ 3
GWS_ 0.1 _ stdN _beta_ 4
GWS_ 0.1 _ stdN _beta_ 5
GWOS_ 0.1 _ stdN _beta_ 1
GWOS_ 0.1 _ stdN _beta_ 2
GWOS_ 0.1 _ stdN _beta_ 3
GWOS_ 0.1 _ stdN _beta_ 4
GWOS_ 0.1 _ stdN _beta_ 5
GWS_ 0.5 _ stdN _beta_ 1
GWS_ 0.5 _ stdN _beta_ 2
GWS_ 0.5 _ stdN _beta_ 3
GWS_ 0.5 _ stdN _beta_ 4
GWS_ 0.5 _ stdN _beta_ 5
beta_p[[i]]
beta 1
beta 2
beta 3
beta 4
beta 5


GWOS_ 0.5 _ stdN _beta_ 1
GWOS_ 0.5 _ stdN _beta_ 2
GWOS_ 0.5 _ stdN _beta_ 3
GWOS_ 0.5 _ stdN _beta_ 4
GWOS_ 0.5 _ stdN _beta_ 5
GWS_ 0.9 _ stdN _beta_ 1
GWS_ 0.9 _ stdN _beta_ 2
GWS_ 0.9 _ stdN _beta_ 3
GWS_ 0.9 _ stdN _beta_ 4
GWS_ 0.9 _ stdN _beta_ 5
GWOS_ 0.9 _ stdN _beta_ 1
GWOS_ 0.9 _ stdN _beta_ 2
GWOS_ 0.9 _ stdN _beta_ 3
GWOS_ 0.9 _ stdN _beta_ 4
GWOS_ 0.9 _ stdN _beta_ 5
beta_p[[i]]
beta 1
beta 2
beta 3
beta 4
beta 5