

QBLD

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How to get qbldcpp?

- Download the qbldcpp folder from the **GitHub repo**,
- Run the following commands :-
 - R CMD build qbldcpp
 - R CMD install qbldcpp_1.0.tar.gz

After finishing the steps:

```
library(qbldcpp)
library(mcmcse)
library(microbenchmark)
library(knitr)

set.seed(10)
#Load the datasets
data(y25) #25th quantile
data(y50) #50th quantile
data(y75) #75th quantile
data("datas") #random effects covariates
data("datax") #fixed effects covariates

##Common Parameters
nsim = 5000
x_intercept = FALSE
s_intercept = TRUE #add the column of 1s to model matrix
b0 = rep(0,3)
B0 = 10*diag(3)
c1 = 10
d1 = 9
burnin = FALSE
```

Blocked Sampler

25th quantile

```
p = 0.25
time_a = Sys.time()
run25 <- qblbf(nsim,p,y25,datax,datas,x_intercept,s_intercept,b0,B0,c1,d1,burnin)
time_b = Sys.time() #Time elapsed

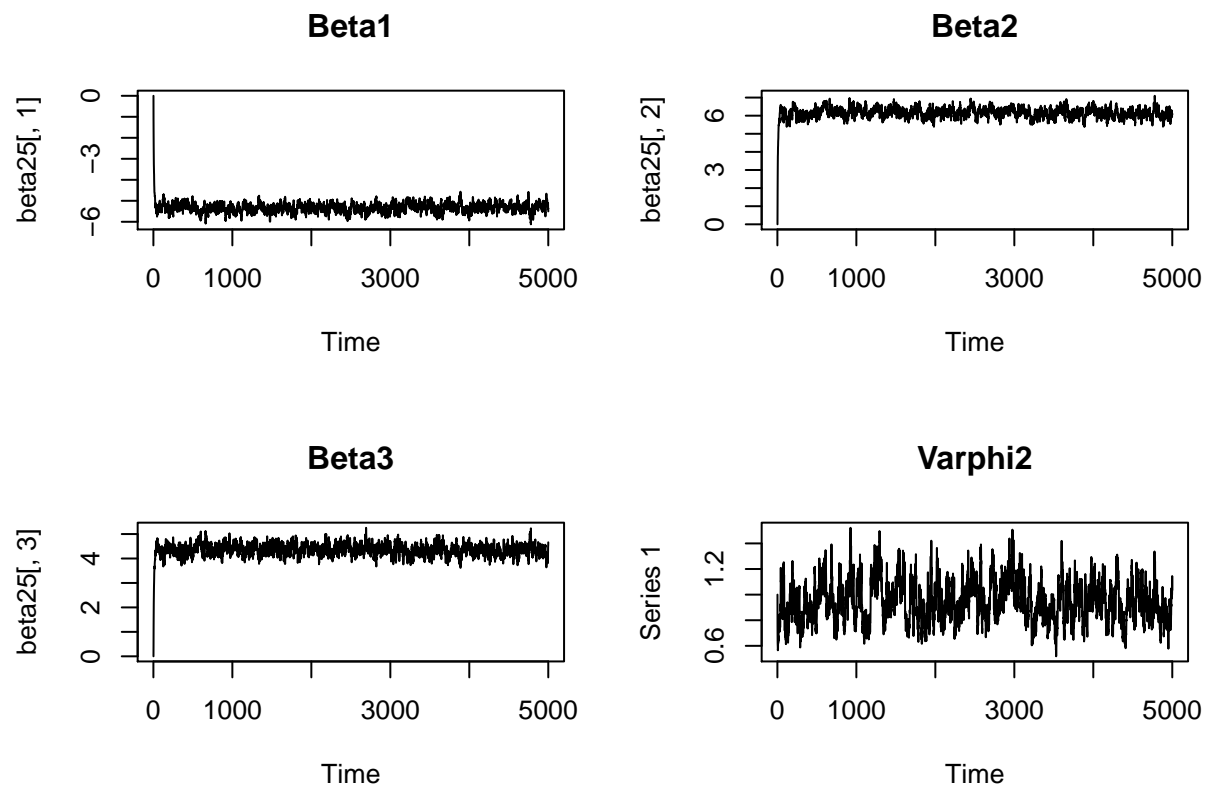
saveRDS(run25,file="run25.rds")
beta25 = t(run25[[1]])
varphi25 = run25[[3]]
```

```
## [1] "Time elapsed = 3.41 min"
```

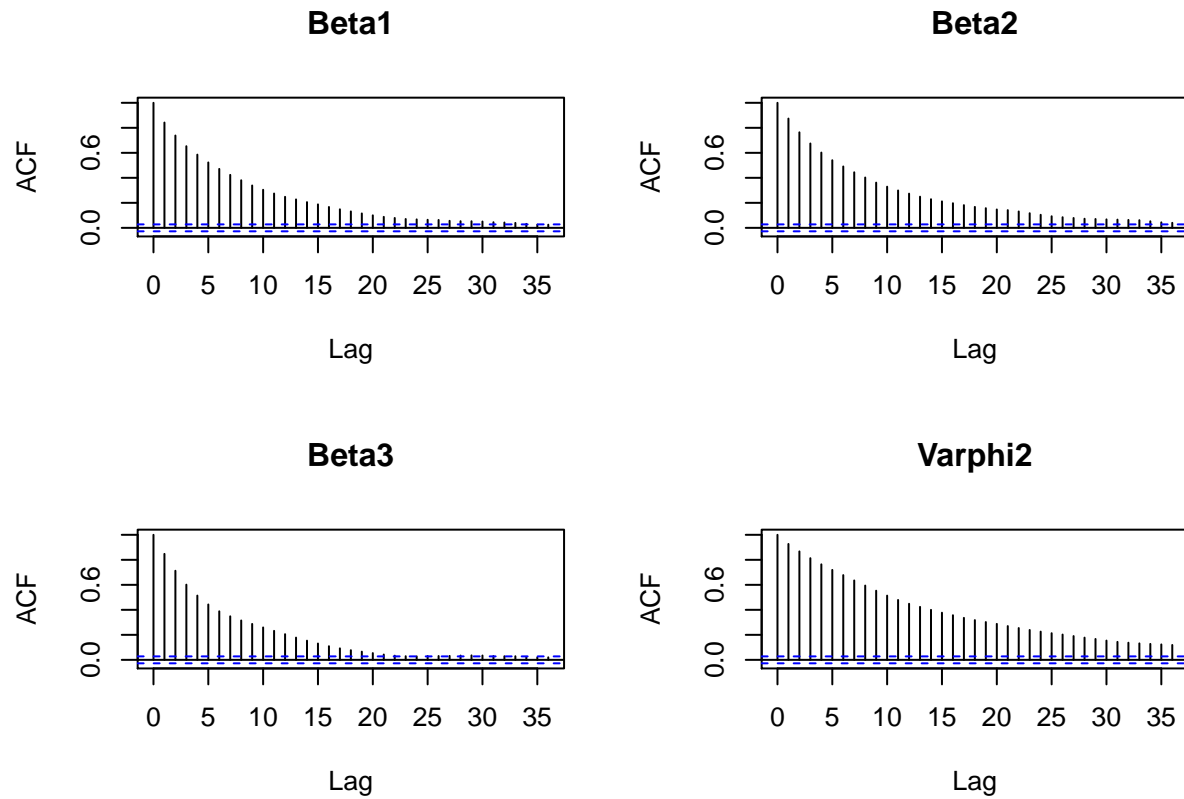
Parameter	True	Paper_mean	Paper_sd	My_mean	My_sd
Beta1	-5	-5.33	0.22	-5.32	0.25
Beta2	6	6.16	0.28	6.15	0.31
Beta3	4	4.34	0.24	4.35	0.26
Varphi2	1	0.95	0.16	0.95	0.16

Plots

```
par(mfrow=c(2,2))
plot.ts(beta25[,1],main="Beta1")
plot.ts(beta25[,2],main="Beta2")
plot.ts(beta25[,3],main="Beta3")
plot.ts(varphi25,main="Varphi2")
```



```
par(mfrow=c(2,2))
acf(beta25[,1],main="Beta1")
acf(beta25[,2],main="Beta2")
acf(beta25[,3],main="Beta3")
acf(varphi25,main="Varphi2")
```



50th quantile

```
p = 0.50
time_a = Sys.time()
run50 <- qblbf(nsim,p,y50,datax,datas,x_intercept,s_intercept,b0,B0,c1,d1,burnin)
time_b = Sys.time() #Time elapsed

saveRDS(run50,file="run50.rds")
beta50 = t(run50[[1]])
varphi50 = run50[[3]]
```

```
## [1] "Time elapsed = 3.39 min"
```

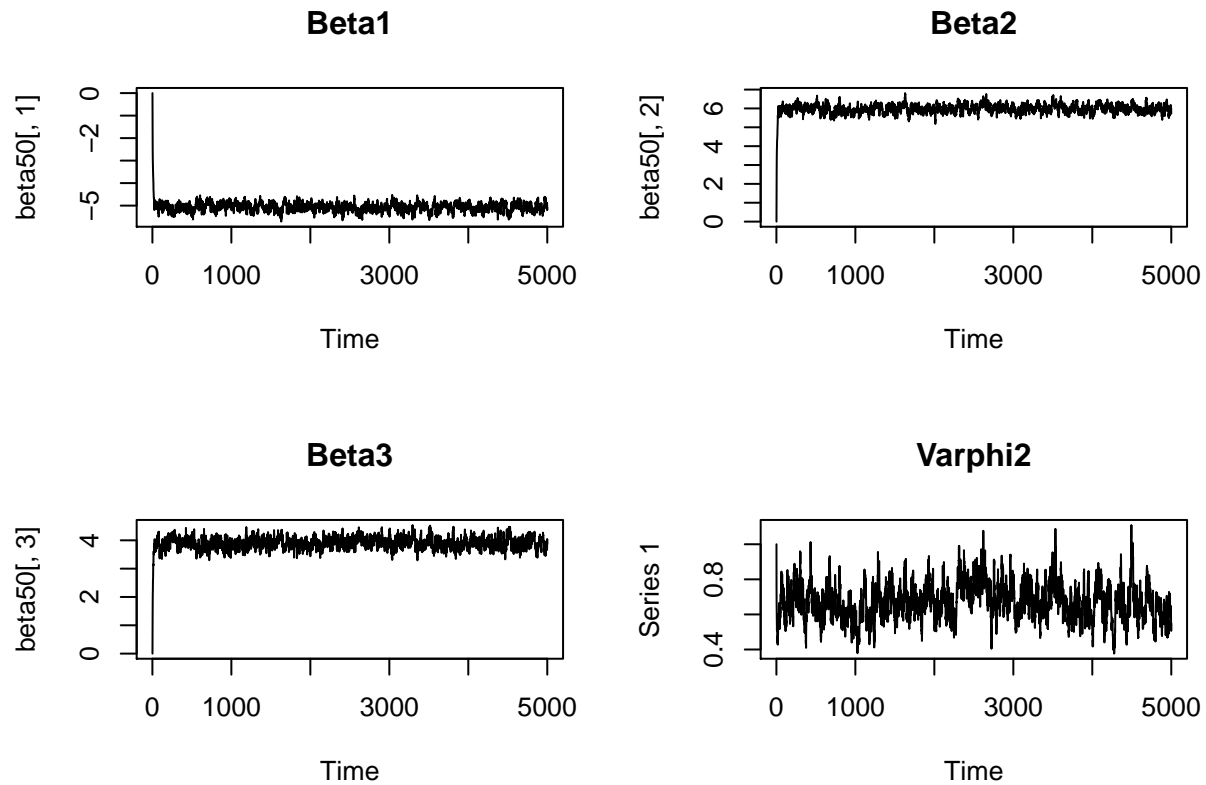
Parameter	True	Paper_mean	Paper_sd	My_mean	My_sd
Beta1	-5	-5.06	0.18	-5.07	0.23
Beta2	6	5.96	0.22	5.97	0.27
Beta3	4	3.88	0.19	3.90	0.22
Varphi2	1	0.66	0.11	0.67	0.10

Plots

```

par(mfrow=c(2,2))
plot.ts(beta50[,1],main="Beta1")
plot.ts(beta50[,2],main="Beta2")
plot.ts(beta50[,3],main="Beta3")
plot.ts(varphi50,main="Varphi2")

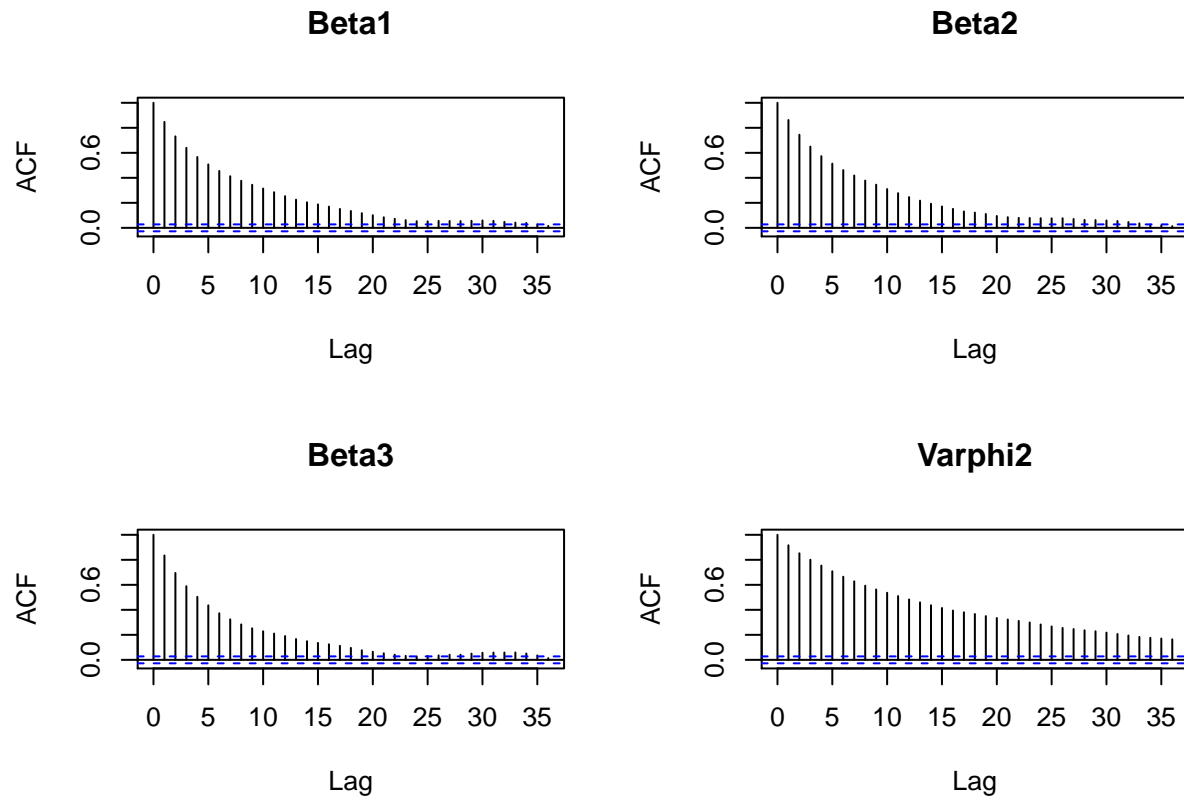
```



```

par(mfrow=c(2,2))
acf(beta50[,1],main="Beta1")
acf(beta50[,2],main="Beta2")
acf(beta50[,3],main="Beta3")
acf(varphi50,main="Varphi2")

```



75th quantile

```
p = 0.75
time_a = Sys.time()
run75 <- qblbf(nsim,p,y75,datax,datas,x_intercept,s_intercept,b0,B0,c1,d1,burnin)
time_b = Sys.time() #Time elapsed

saveRDS(run75,file="run75.rds")
beta75 = t(run75[[1]])
varphi75 = run75[[3]]
```

```
## [1] "Time elapsed = 3.33 mi "
      n
```

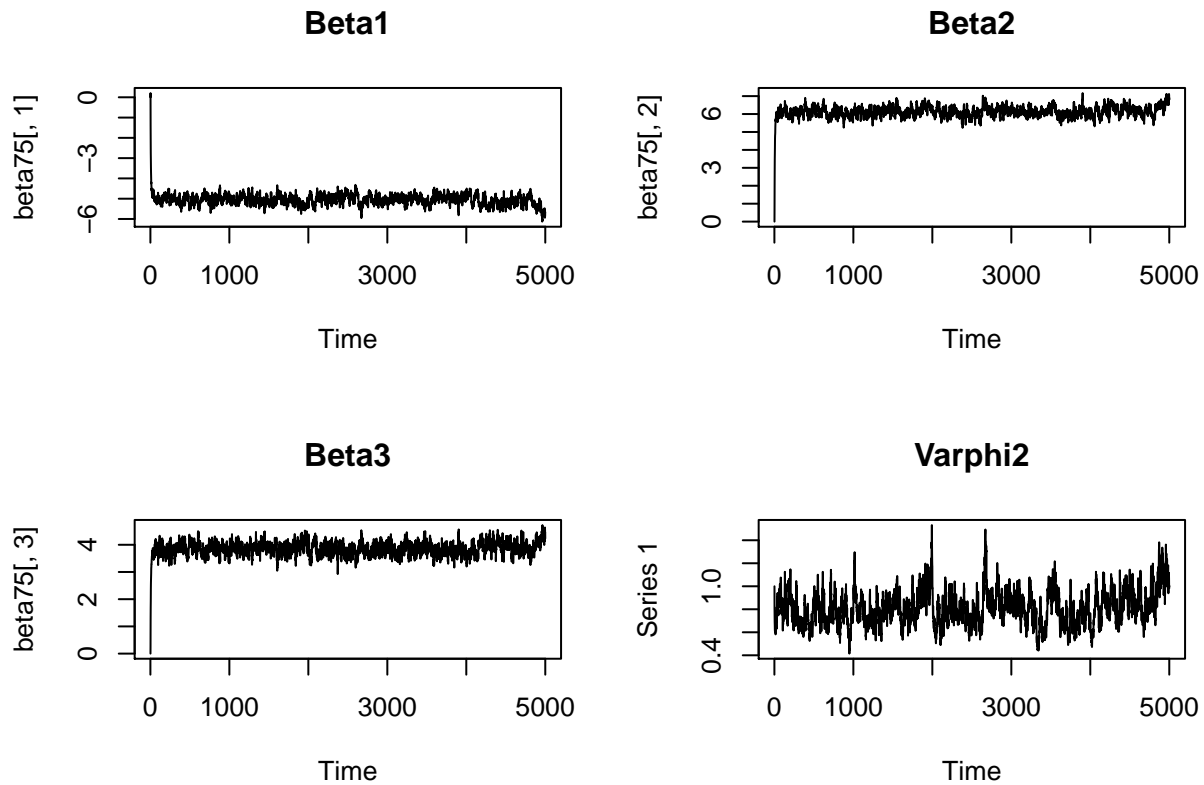
Parameter	True	Paper_mean	Paper_sd	My_mean	My_sd
Beta1	-5	-5.08	0.24	-5.05	0.28
Beta2	6	6.16	0.27	6.12	0.32
Beta3	4	3.88	0.23	3.86	0.26
Varphi2	1	0.81	0.15	0.81	0.15

Plots

```

par(mfrow=c(2,2))
plot.ts(beta75[,1],main="Beta1")
plot.ts(beta75[,2],main="Beta2")
plot.ts(beta75[,3],main="Beta3")
plot.ts(varphi75,main="Varphi2")

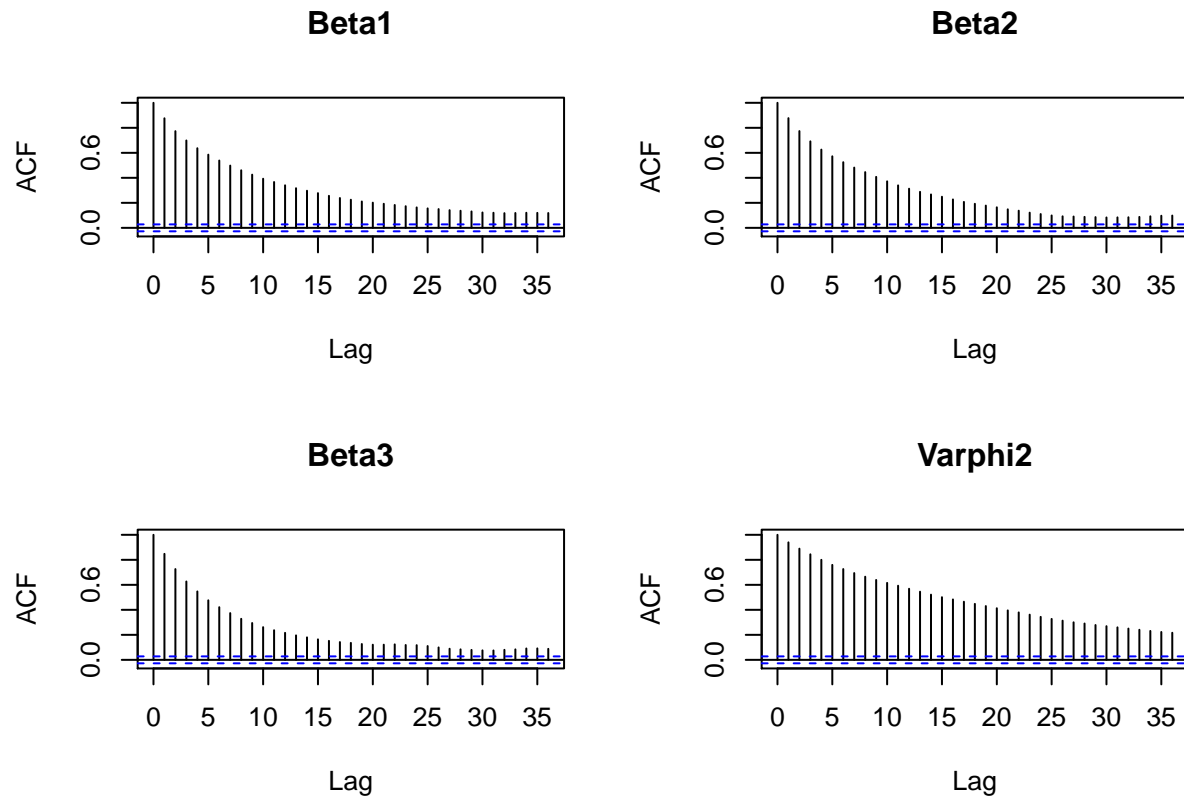
```



```

par(mfrow=c(2,2))
acf(beta75[,1],main="Beta1")
acf(beta75[,2],main="Beta2")
acf(beta75[,3],main="Beta3")
acf(varphi75,main="Varphi2")

```



Unblocked Sampler

25th quantile

```
nsim = 12000
p = 0.25
time_a = Sys.time()
run25_unblock <- qblunblock(nsim,p,y25,datax,datas,x_intercept,s_intercept,b0,B0,c1,d1,burnin)
time_b = Sys.time() #Time elapsed

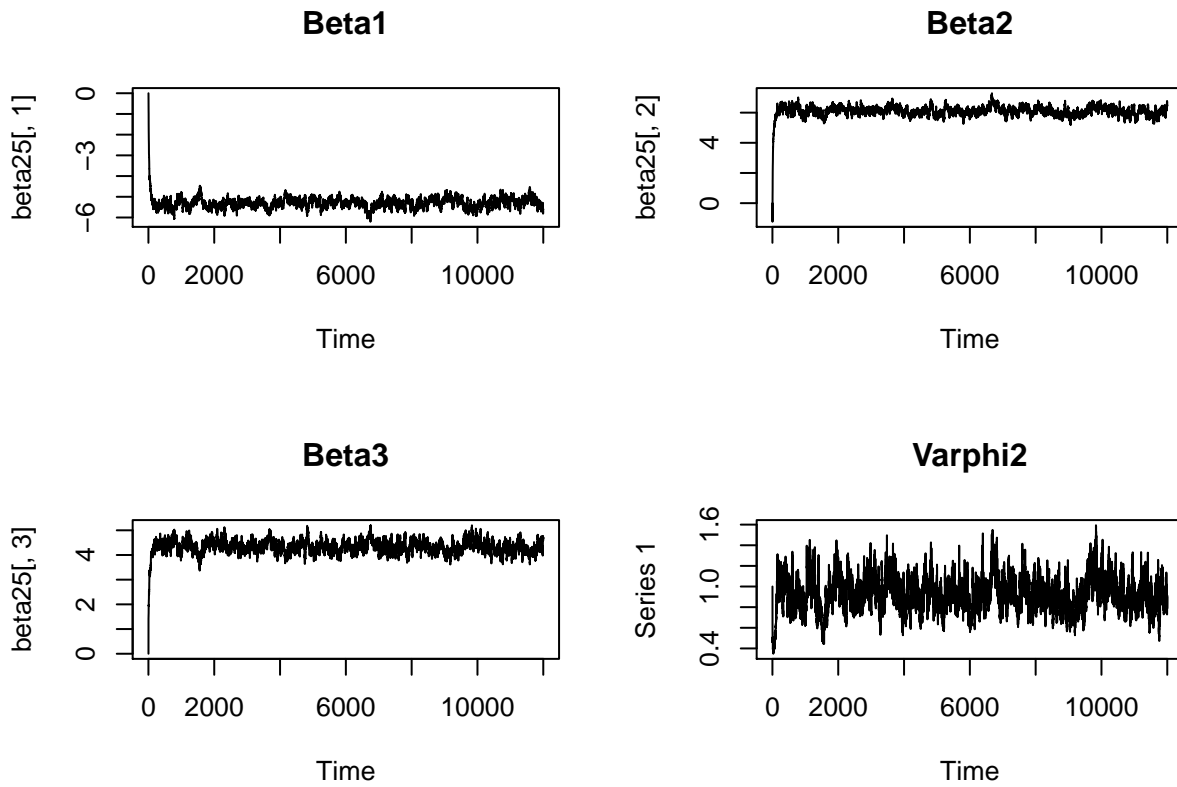
saveRDS(run25_unblock,file="run25_unblock.rds")
beta25 = t(run25_unblock[[1]])
varphi25 = run25_unblock[[3]]
```

```
## [1] "Time elapsed = 1.89 min"
```

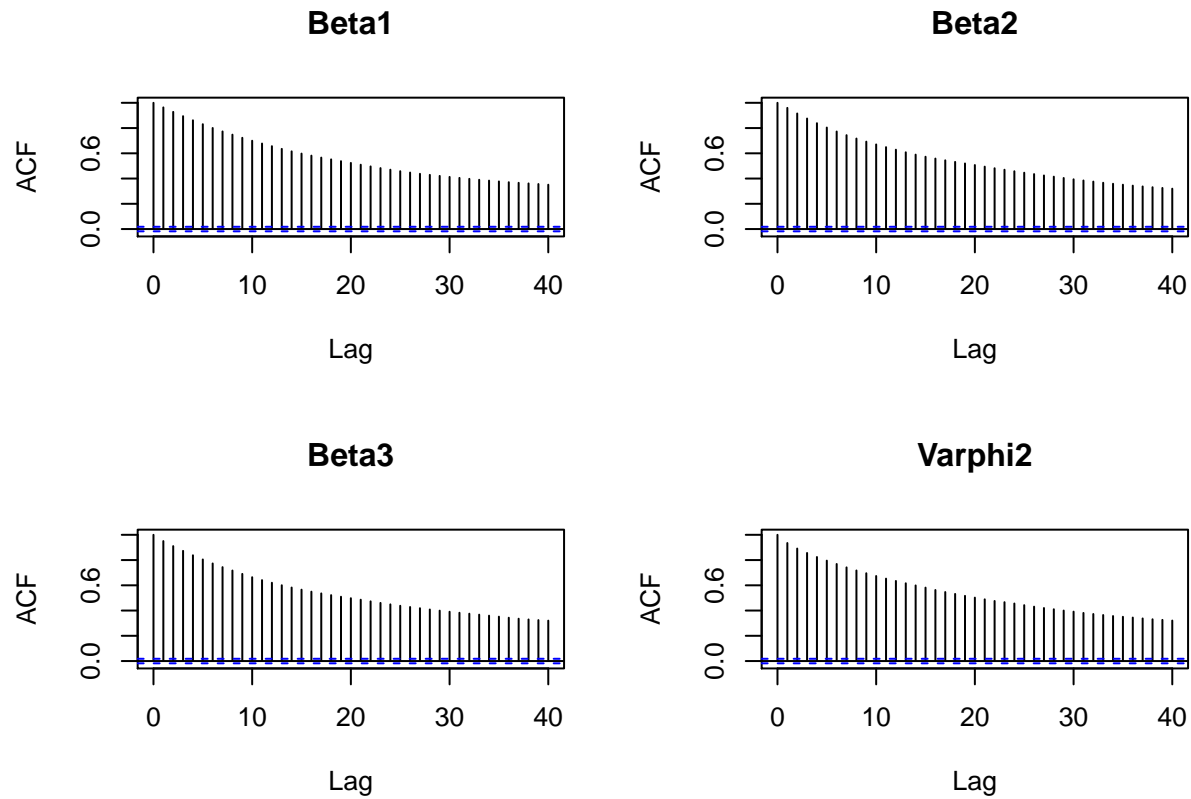
Parameter	True	Paper_mean	Paper_sd	My_mean	My_sd
Beta1	-5	-5.32	0.22	-5.30	0.28
Beta2	6	6.15	0.27	6.09	0.34
Beta3	4	4.35	0.24	4.33	0.28
Varphi2	1	0.95	0.16	0.92	0.17

Plots

```
par(mfrow=c(2,2))
plot.ts(beta25[,1],main="Beta1")
plot.ts(beta25[,2],main="Beta2")
plot.ts(beta25[,3],main="Beta3")
plot.ts(varphi25,main="Varphi2")
```



```
par(mfrow=c(2,2))
acf(beta25[,1],main="Beta1")
acf(beta25[,2],main="Beta2")
acf(beta25[,3],main="Beta3")
acf(varphi25,main="Varphi2")
```



50th quantile

```
p = 0.50
time_a = Sys.time()
run50_unblock <- qblidunblock(nsim,p,y50,datax,datas,x_intercept,s_intercept,b0,B0,c1,d1,burnin)
time_b = Sys.time() #Time elapsed

saveRDS(run50_unblock,file="run50_unblock.rds")
beta50 = t(run50_unblock[[1]])
varphi50 = run50_unblock[[3]]
```

```
## [1] "Time elapsed = 1.91 min"
```

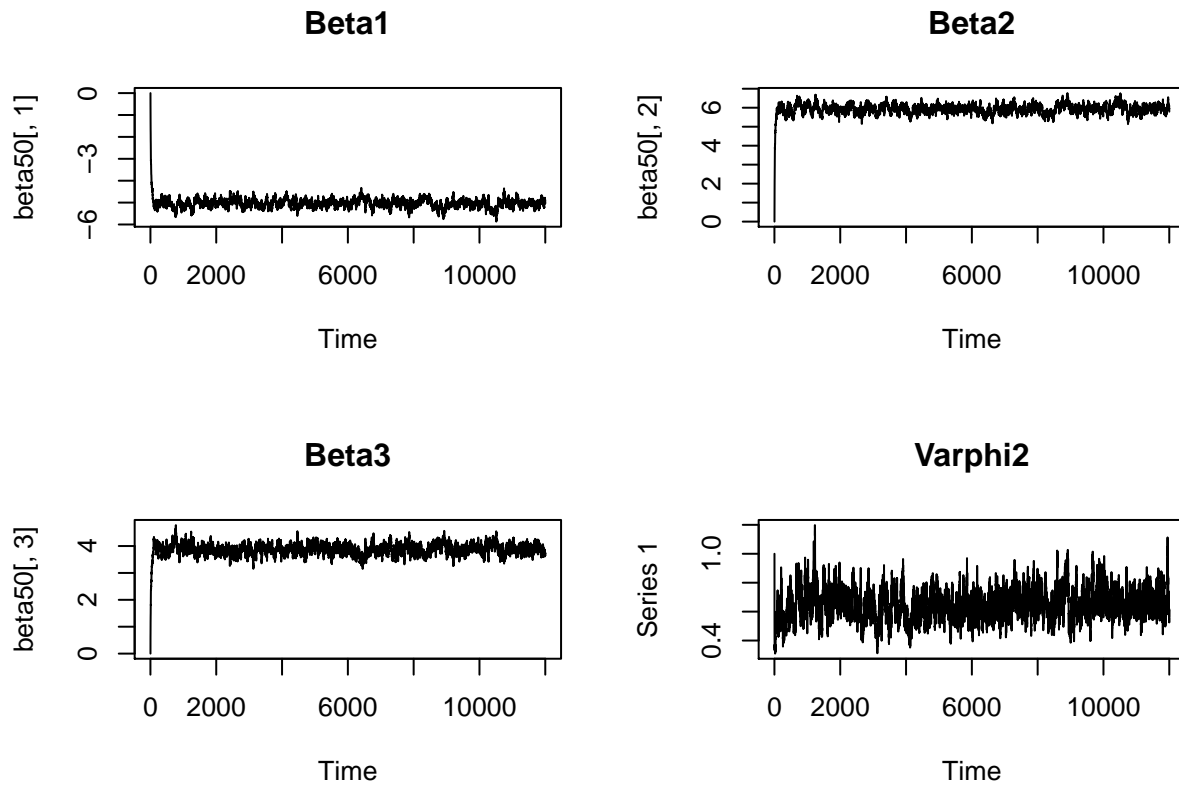
Parameter	True	Paper_mean	Paper_sd	My_mean	My_sd
Beta1	-5	-5.05	0.20	-5.03	0.24
Beta2	6	5.95	0.23	5.92	0.27
Beta3	4	3.88	0.20	3.87	0.22
Varphi2	1	0.66	0.11	0.64	0.10

Plots

```

par(mfrow=c(2,2))
plot.ts(beta50[,1],main="Beta1")
plot.ts(beta50[,2],main="Beta2")
plot.ts(beta50[,3],main="Beta3")
plot.ts(varphi50,main="Varphi2")

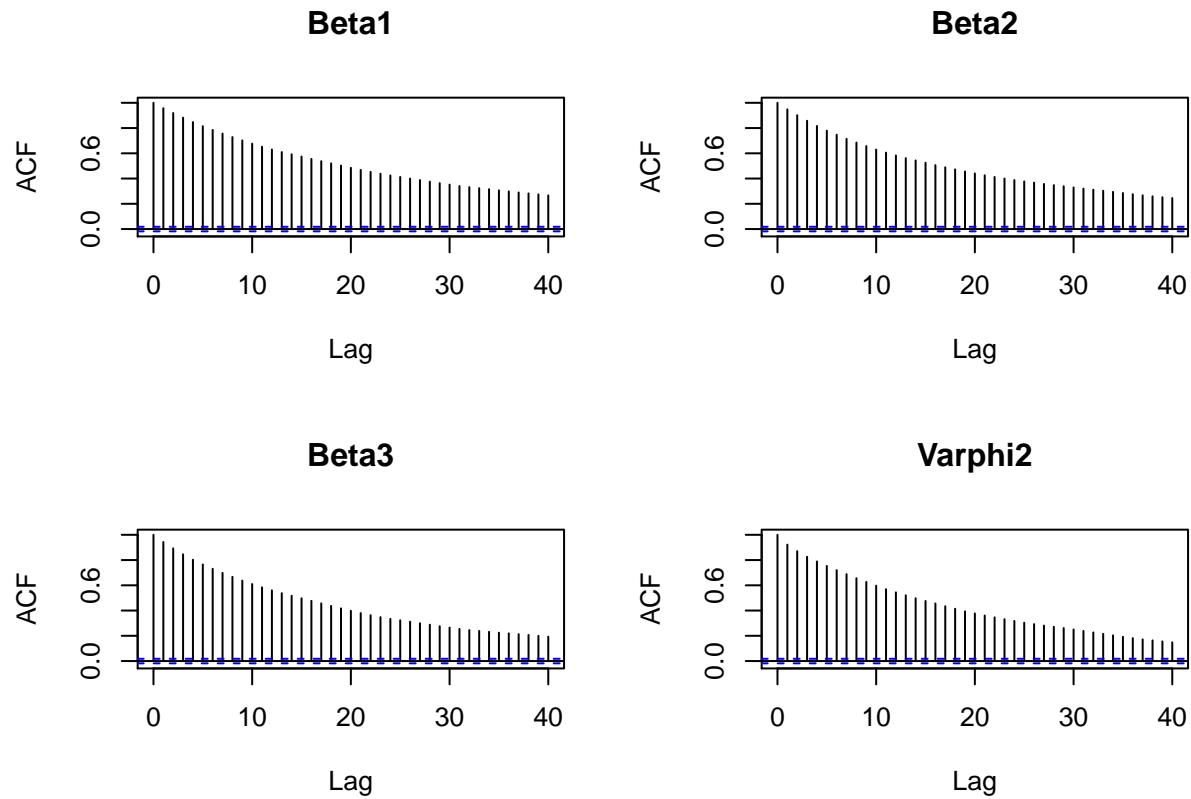
```



```

par(mfrow=c(2,2))
acf(beta50[,1],main="Beta1")
acf(beta50[,2],main="Beta2")
acf(beta50[,3],main="Beta3")
acf(varphi50,main="Varphi2")

```



75th quantile

```
p = 0.75
time_a = Sys.time()
run75_unblock <- qblidunblock(nsim,p,y75,datax,datas,x_intercept,s_intercept,b0,B0,c1,d1,burnin)
time_b = Sys.time() #Time elapsed

saveRDS(run75_unblock,file="run75_unblock.rds")
beta75 = t(run75_unblock[[1]])
varphi75 = run75_unblock[[3]]
```

```
## [1] "Time elapsed = 1.9 min"
```

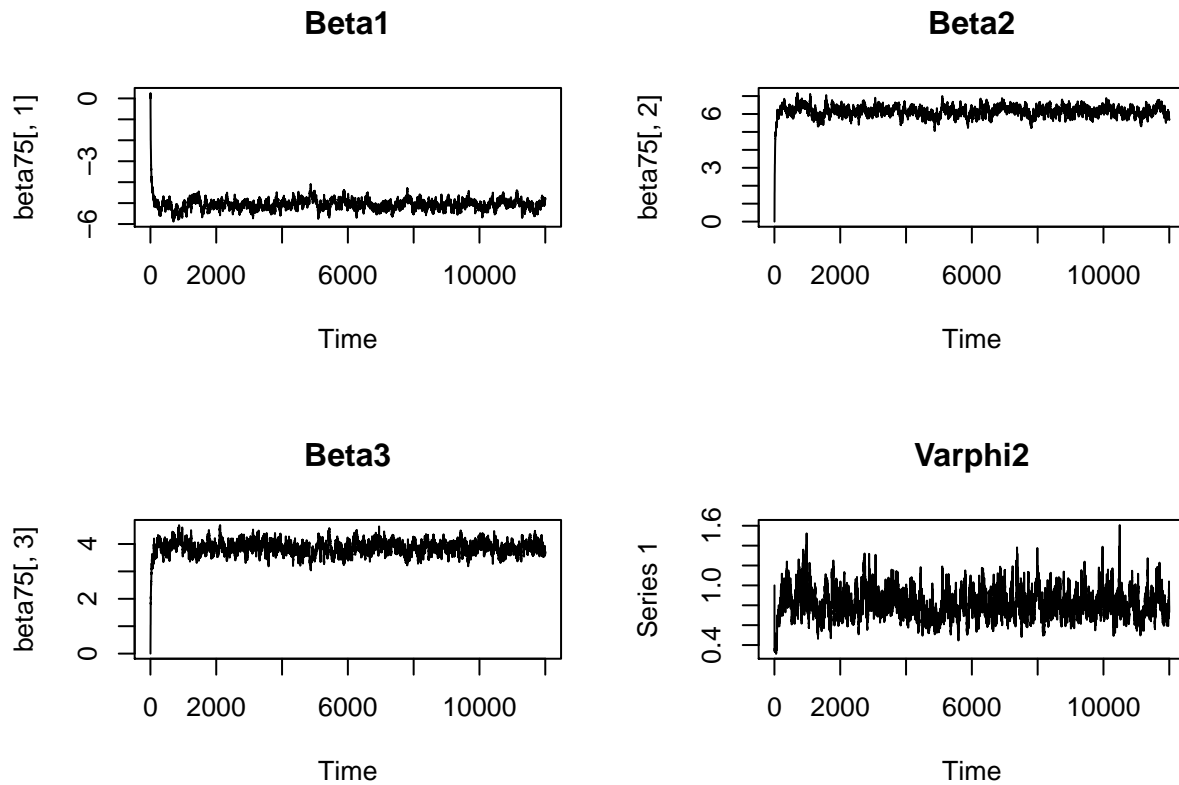
Parameter	True	Paper_mean	Paper_sd	My_mean	My_sd
Beta1	-5	-5.08	0.24	-5.06	0.28
Beta2	6	6.16	0.27	6.13	0.32
Beta3	4	3.88	0.23	3.87	0.25
Varphi2	1	0.81	0.15	0.81	0.14

Plots

```

par(mfrow=c(2,2))
plot.ts(beta75[,1],main="Beta1")
plot.ts(beta75[,2],main="Beta2")
plot.ts(beta75[,3],main="Beta3")
plot.ts(varphi75,main="Varphi2")

```



```

par(mfrow=c(2,2))
acf(beta75[,1],main="Beta1")
acf(beta75[,2],main="Beta2")
acf(beta75[,3],main="Beta3")
acf(varphi75,main="Varphi2")

```

