

Package ‘spatialSPsurv’

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Type Package

Title Bayesian Spatial Split Population Survival Model

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Description Contains functions to fit Bayesian spatial survival model for split population.

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LinkingTo Rcpp,
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Imports MCMCpack,
FastGP,
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RcppArmadillo,
coda

R topics documented:

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| | |
|------------|-------------------|
| betas.post | <i>betas.post</i> |
|------------|-------------------|

Description

log-posterior distribution of betas with pth element fixed as betas.p

Usage

betas.post(betas.p, p, Sigma.b, Y, Y0, X, W, betas, delta, C, LY, rho, form)

Arguments

| | |
|---------|---|
| betas.p | current value of the pth element of betas |
| p | pth element |
| Sigma.b | variance estimate of betas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| form | type of parametric model (Exponential or Weibull) |

Value

log- posterior density of betas

betas.slice.sampling *betas.slice.sampling*

Description

slice sampling for betas

Usage

```
betas.slice.sampling(
  Sigma.b,
  Y,
  Y0,
  X,
  W,
  betas,
  delta,
  C,
  LY,
  rho,
  w,
  m,
  form
)
```

Arguments

| | |
|---------|---|
| Sigma.b | variance estimate of betas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| w | size of the slice in the slice sampling. A vector of values for beta, gamma, rho. |
| m | limit on steps in the slice sampling |
| form | type of parametric model (Exponential or Weibull) |

Value

One sample update using slice sampling

frailtySPsurv

*frailtySPsurv***Description**

Markov Chain Monte Carlo (MCMC) to run Bayesian non-spatial frailty split population survival model

Usage

```
frailtySPsurv(
  formula,
  duration,
  immune,
  Y0,
  LY,
  S,
  data = list(),
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```

Arguments

| | |
|----------|--|
| formula | ... |
| duration | ... |
| immune | ... |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| LY | last observation year |
| S | spatial information (e.g. district ID) for each observation that matches the spatial matrix row/column information |
| data | ... |
| N | number of MCMC iterations |
| burn | burn-in to be discarded |
| thin | thinning to prevent from autocorrelation |
| w | size of the slice in the slice sampling for (betas, gammas, rho). Write it as a vector. E.g. c(1,1,1) |
| m | limit on steps in the slice sampling. A vector of values for beta, gamma, rho. |
| form | type of parametric model (Exponential or Weibull) |
| prop.var | ... |

Value

chain of the variables of interest

| | |
|--------------------------|--------------------|
| <code>gammas.post</code> | <i>gammas.post</i> |
|--------------------------|--------------------|

Description

log-posterior distribution of gammas with pth element fixed as gammas.p

Usage

```
gammas.post(gammas.p, p, Sigma.g, Y, Y0, eXB, Z, gammas, C, LY, rho, form)
```

Arguments

| | |
|-----------------------|---|
| <code>gammas.p</code> | current value of the pth element of gammas |
| <code>p</code> | pth element |
| <code>Sigma.g</code> | variance estimate of gammas |
| <code>Y</code> | the time (duration) dependent variable for the survival stage (t) |
| <code>Y0</code> | the elapsed time since inception until the beginning of time period (t-1) |
| <code>eXB</code> | exponentiated vector of covariates times betas |
| <code>Z</code> | covariates for gammas |
| <code>gammas</code> | current value of gammas |
| <code>C</code> | censoring indicator |
| <code>LY</code> | last observation year |
| <code>rho</code> | current value of rho |
| <code>form</code> | type of parametric model (Exponential or Weibull) |

Value

log- posterior density of betas

| | |
|---------------------------|---------------------|
| <code>gammas.post2</code> | <i>gammas.post2</i> |
|---------------------------|---------------------|

Description

log-posterior distribution of gammas with pth element fixed as gammas.p

Usage

```
gammas.post2(gammas.p, p, Sigma.g, Y, Y0, eXB, Z, V, gammas, C, LY, rho, form)
```

Arguments

| | |
|----------|---|
| gammas.p | current value of the pth element of gammas |
| p | pth element |
| Sigma.g | variance estimate of gammas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| V | spatial random effects |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| form | type of parametric model (Exponential or Weibull) |

Value

log- posterior density of betas

gammas.slice.sampling *gammas.slice.sampling*

Description

slice sampling for gammas

Usage

```
gammas.slice.sampling(Sigma.g, Y, Y0, eXB, Z, gammas, C, LY, rho, w, m, form)
```

Arguments

| | |
|---------|---|
| Sigma.g | variance estimate of gammas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| w | size of the slice in the slice sampling |
| m | limit on steps in the slice sampling |
| form | type of parametric model (Exponential or Weibull) |

Value

One sample update using slice sampling

```
gammas.slice.sampling2
      gammas.slice.sampling2
```

Description

slice sampling for gammas

Usage

```
gammas.slice.sampling2(
  Sigma.g,
  Y,
  Y0,
  eXB,
  Z,
  V,
  gammas,
  C,
  LY,
  rho,
  w,
  m,
  form
)
```

Arguments

| | |
|----------------------|---|
| <code>Sigma.g</code> | variance estimate of gammas |
| <code>Y</code> | the time (duration) dependent variable for the survival stage (t) |
| <code>Y0</code> | the elapsed time since inception until the beginning of time period (t-1) |
| <code>eXB</code> | exponentiated vector of covariates times betas |
| <code>Z</code> | covariates for gammas |
| <code>V</code> | spatial random effects |
| <code>gammas</code> | current value of gammas |
| <code>C</code> | censoring indicator |
| <code>LY</code> | last observation year |
| <code>rho</code> | current value of rho |
| <code>w</code> | size of the slice in the slice sampling. A vector of values for beta, gamma, rho. |
| <code>m</code> | limit on steps in the slice sampling |
| <code>form</code> | type of parametric model (Exponential or Weibull) |

Value

One sample update using slice sampling

```
lambda.gibbs.sampling2
      lambda.gibbs.sampling2
```

Description

log-posterior distribution of rho

Usage

```
lambda.gibbs.sampling2(S, A, W, V, a = 1, b = 1)
```

Arguments

| | |
|---|--|
| S | spatial information (e.g. district) |
| A | adjacency information corresponding to spatial information |
| W | spatial random effects |
| V | spatial random effects |
| a | shape parameter of gammas prior |
| b | scale parameter of gammas prior |

Value

log- posterior density of betas

```
mcmcfrailtySP      mcmcfrailtySP
```

Description

Markov Chain Monte Carlo (MCMC) routine to run Bayesian non-spatial frailties split population survival model

Usage

```
mcmcfrailtySP(
  Y,
  Y0,
  C,
  LY,
  X,
  Z,
  S,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```


Arguments

| | |
|----------|--|
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| C | censoring indicator |
| LY | last observation year |
| X | covariates for betas |
| Z | covariates for gammas |
| S | spatial information (e.g. district) |
| N | number of MCMC iterations |
| burn | burn-in to be discarded |
| thin | thinning to prevent from autocorrelation |
| w | size of the slice in the slice sampling for (betas, gammas, rho) |
| m | limit on steps in the slice sampling. A vector of values for beta, gamma, rho. |
| form | type of parametric model (Exponential or Weibull) |
| prop.var | proposal variance for Metropolis-Hastings |
| A | adjacency information corresponding to spatial information |

Value

chain of the variables of interest

| | |
|--------|---------------|
| mcmcSP | <i>mcmcSP</i> |
|--------|---------------|

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian split population survival model with no frailties

Usage

```
mcmcSP(Y, Y0, C, LY, X, Z, N, burn, thin, w = c(1, 1, 1), m = 10, form)
```

Arguments

| | |
|------|--|
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| C | censoring indicator |
| X | covariates for betas |
| Z | covariates for gammas |
| N | number of MCMC iterations |
| burn | burn-in to be discarded |
| thin | thinning to prevent from autocorrelation |
| w | size of the slice in the slice sampling for (betas, gammas, rho) |
| m | limit on steps in the slice sampling. A vector of values for beta, gamma, rho. |
| form | type of parametric model (Exponential or Weibull) |

Value

chain of the variables of interest

mcmcspatialSP

mcmcspatialSP

Description

Markov Chain Monte Carlo (MCMC) routine for Bayesian spatial split population survival model

Usage

```
mcmcspatialSP(
  Y,
  Y0,
  C,
  LY,
  X,
  Z,
  S,
  A,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```

Arguments

| | |
|----------|--|
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| C | censoring indicator |
| LY | last observation year |
| X | covariates for betas |
| Z | covariates for gammas |
| S | spatial information (e.g. district) |
| A | adjacency information corresponding to spatial information |
| N | number of MCMC iterations |
| burn | burn-in to be discarded |
| thin | thinning to prevent from autocorrelation |
| w | size of the slice in the slice sampling for (betas, gammas, rho) |
| m | limit on steps in the slice sampling. A vector of values for beta, gamma, rho. |
| form | type of parametric model (Exponential or Weibull) |
| prop.var | proposal variance for Metropolis-Hastings |

Value

chain of the variables of interest

| | |
|----------|-----------------|
| rho.post | <i>rho.post</i> |
|----------|-----------------|

Description

log-posterior distribution of rho

Usage

```
rho.post(Y, Y0, eXB, delta, C, LY, rho, a = 1, b = 1)
```

Arguments

| | |
|-------|---|
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| a | shape parameter of gammas prior |
| b | scale parameter of gammas prior |

Value

log- posterior density of betas

| | |
|--------------------|---------------------------|
| rho.slice.sampling | <i>rho.slice.sampling</i> |
|--------------------|---------------------------|

Description

univariate slice sampling for rho

Usage

```
rho.slice.sampling(
  Y,
  Y0,
  eXB,
  delta,
  C,
  LY,
  rho,
  w,
  m,
  lower = 0.01,
  upper = +Inf
)
```

Arguments

| | |
|-------|---|
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| w | size of the slice in the slice sampling. A vector of values for beta, gamma, rho. |
| m | limit on steps in the slice sampling |
| lower | lower bound on support of the distribution |
| upper | upper bound on support of the distribution |

Value

One sample update using slice sampling

spatialSPsurv

spatialSPsurv

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian spatial split population survival model

Usage

```
spatialSPsurv(
  duration,
  immune,
  Y0,
  LY,
  S,
```

```

data = list(),
A,
N,
burn,
thin,
w = c(1, 1, 1),
m = 10,
form,
prop.var
)

```

Arguments

| | |
|----------|--|
| duration | ... |
| immune | ... |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| LY | last observation year |
| S | spatial information (e.g. district ID) for each observation that matches the spatial matrix row/column information |
| data | ... |
| A | Spatial Matrix (load separate spatial weights matrix file) |
| N | number of MCMC iterations |
| burn | burn-in to be discarded |
| thin | thinning to prevent from autocorrelation |
| w | size of the slice in the slice sampling for (betas, gammas, rho). Write it as a vector. E.g. c(1,1,1) |
| m | limit on steps in the slice sampling. A vector of values for beta, gamma, rho. |
| form | type of parametric model (Exponential or Weibull) |
| prop.var | proposal variance for Metropolis-Hastings |

Value

chain of the variables of interest

SPsurv

SPsurv

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian split population survival model with no frailties

Usage

```
SPsurv(
  duration,
  immune,
  Y0,
  LY,
  data = list(),
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form
)
```

Arguments

| | |
|----------|---|
| duration | ... |
| immune | ... |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| LY | last observation year |
| data | ... |
| N | number of MCMC iterations |
| burn | burn-in to be discarded |
| thin | thinning to prevent from autocorrelation |
| w | size of the slice in the slice sampling for (betas, gammas, rho). Write it as a vector. E.g. c(1,1,1) |
| m | limit on steps in the slice sampling. A vector of values for beta, gamma, rho. |
| form | type of parametric model (Exponential or Weibull) |

Value

chain of the variables of interest

```
univ.betas.slice.sampling
  univ.betas.slice.sampling
```

Description

univariate slice sampling for betas.p

Usage

```

univ.betas.slice.sampling(
  betas.p,
  p,
  Sigma.b,
  Y,
  Y0,
  X,
  W,
  betas,
  delta,
  C,
  LY,
  rho,
  w,
  m,
  lower = -Inf,
  upper = +Inf,
  form
)

```

Arguments

| | |
|---------|---|
| betas.p | current value of the pth element of betas |
| p | pth element |
| Sigma.b | variance estimate of betas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| w | size of the slice in the slice sampling |
| m | limit on steps in the slice sampling |
| lower | lower bound on support of the distribution |
| upper | upper bound on support of the distribution |
| form | type of parametric model (Exponential or Weibull) |

Value

One sample update using slice sampling

```
univ.gammas.slice.sampling
      univ.gammas.slice.sampling
```

Description

univariate slice sampling for gammas.p

Usage

```
univ.gammas.slice.sampling(
  gammas.p,
  p,
  Sigma.g,
  Y,
  Y0,
  eXB,
  Z,
  gammas,
  C,
  LY,
  rho,
  w,
  m,
  lower = -Inf,
  upper = +Inf,
  form
)
```

Arguments

| | |
|----------|---|
| gammas.p | current value of the pth element of gammas |
| p | pth element |
| Sigma.g | variance estimate of gammas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| w | size of the slice in the slice sampling |
| m | limit on steps in the slice sampling |
| lower | lower bound on support of the distribution |
| upper | upper bound on support of the distribution |
| form | type of parametric model (Exponential or Weibull) |

Value

One sample update using slice sampling

```
univ.gammas.slice.sampling2
      univ.gammas.slice.sampling2
```

Description

univariate slice sampling for gammas.p

Usage

```
univ.gammas.slice.sampling2(
  gammas.p,
  p,
  Sigma.g,
  Y,
  Y0,
  eXB,
  Z,
  V,
  gammas,
  C,
  LY,
  rho,
  w,
  m,
  lower = -Inf,
  upper = +Inf,
  form
)
```

Arguments

| | |
|----------|---|
| gammas.p | current value of the pth element of gammas |
| p | pth element |
| Sigma.g | variance estimate of gammas |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| V | spatial random effects |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |

| | |
|-------|---|
| w | size of the slice in the slice sampling. A vector of values for beta, gamma, rho. |
| m | limit on steps in the slice sampling |
| lower | lower bound on support of the distribution |
| upper | upper bound on support of the distribution |
| form | type of parametric model (Exponential or Weibull) |

Value

One sample update using slice sampling

| | |
|-----------------|--|
| V.F.MH.sampling | <i>V.F.MH.sampling (Cure Model with non-spatial Frailties)</i> |
|-----------------|--|

Description

MH sampling for rcpp_log_dmvnorm

Usage

```
V.F.MH.sampling(Sigma.v, S, Y, Y0, eXB, Z, V, gammas, C, LY, rho, prop.var)
```

Arguments

| | |
|----------|---|
| S | spatial information (e.g. district) |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| V | spatial random effects |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| prop.var | proposal variance for Metropolis-Hastings |

Value

One sample update using slice sampling

| | |
|----------|-----------------|
| V.F.post | <i>V.F.post</i> |
|----------|-----------------|

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
V.F.post(Sigma.v, S, Y, Y0, eXB, Z, V, gammas, C, LY, rho)
```

Arguments

| | |
|--------|---|
| S | spatial information (e.g. district) |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| V | spatial random effects |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |

Value

log- posterior density of betas

| | |
|---------------|----------------------|
| V.MH.sampling | <i>V.MH.sampling</i> |
|---------------|----------------------|

Description

MH sampling for rcpp_log_dmvnorm

Usage

```
V.MH.sampling(S, A, lambda, Y, Y0, eXB, Z, V, gammas, C, LY, rho, prop.var)
```

Arguments

| | |
|----------|---|
| S | spatial information (e.g. district) |
| A | adjacency information corresponding to spatial information |
| lambda | CAR parameter |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| V | spatial random effects |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| prop.var | proposal variance for Metropolis-Hastings |

Value

One sample update using slice sampling

| | |
|---------------|---------------|
| <i>V.post</i> | <i>V.post</i> |
|---------------|---------------|

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
V.post(S, A, lambda, Y, Y0, eXB, Z, V, gammas, C, LY, rho)
```

Arguments

| | |
|--------|---|
| S | spatial information (e.g. district) |
| A | adjacency information corresponding to spatial information |
| lambda | CAR parameter |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| eXB | exponentiated vector of covariates times betas |
| Z | covariates for gammas |
| V | spatial random effects |
| gammas | current value of gammas |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |

Value

log- posterior density of betas

| | |
|-----------------|--|
| W.F.MH.sampling | <i>W.F.MH.sampling (Cure Model with Frailties)</i> |
|-----------------|--|

Description

MH sampling for W

Usage

```
W.F.MH.sampling(Sigma.w, S, Y, Y0, X, W, betas, delta, C, LY, rho, prop.var)
```

Arguments

| | |
|----------|---|
| S | spatial information (e.g. district) |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| prop.var | proposal variance for Metropolis-Hastings |

Value

One sample update using slice sampling

| | |
|----------|-----------------|
| W.F.post | <i>W.F.post</i> |
|----------|-----------------|

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
W.F.post(Sigma.w, S, Y, Y0, X, W, betas, delta, C, LY, rho)
```

Arguments

| | |
|-------|---|
| S | spatial information (e.g. district) |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |

Value

log- posterior density of W

| | |
|---------------|----------------------|
| W.MH.sampling | <i>W.MH.sampling</i> |
|---------------|----------------------|

Description

MH Sampling for W

Usage

```
W.MH.sampling(S, A, lambda, Y, Y0, X, W, betas, delta, C, LY, rho, prop.var)
```

Arguments

| | |
|----------|---|
| S | spatial information (e.g. district) |
| A | adjacency information corresponding to spatial information |
| lambda | CAR parameter |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |
| prop.var | proposal variance for Metropolis-Hastings |

Value

One sample update using slice sampling

| | |
|--------|---------------|
| W.post | <i>W.post</i> |
|--------|---------------|

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
W.post(S, A, lambda, Y, Y0, X, W, betas, delta, C, LY, rho)
```

Arguments

| | |
|--------|---|
| S | spatial information (e.g. district) |
| A | adjacency information corresponding to spatial information |
| lambda | CAR parameter |
| Y | the time (duration) dependent variable for the survival stage (t) |
| Y0 | the elapsed time since inception until the beginning of time period (t-1) |
| X | covariates for betas |
| W | spatial random effects |
| betas | current value of betas |
| delta | probability of true censoring |
| C | censoring indicator |
| LY | last observation year |
| rho | current value of rho |

Value

log- posterior density of W

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