

Student- t model for Stochastic volatility

Parametrization

The Student- t likelihood for stochastic volatility models is defined as:

$$\pi(y|\eta) = \sigma\epsilon$$

where

$$\epsilon \sim T_\nu$$

and T_ν is a Student- t distribution with ν degrees of freedom *standardised* to that is has mean 0 and variance 1 for any value of ν .

Link-function

The squared scale parameter σ is linked to the linear predictor η as:

$$\sigma^2 = \exp(\eta)$$

Hyperparameters

The degrees of freedom ν is represented as

$$\theta = \log(\nu - 2)$$

and the prior is defined on θ

Specification

- family = `stochvol.t`
- Required argument: y .

Hyperparameter spesification and default values

hyper

theta

name log degrees of freedom

short.name dof

initial 4

fixed FALSE

prior loggamma

param 1 0.5

to.theta function(x) log(x-2)

from.theta function(x) 2+exp(x)

survival FALSE

discrete FALSE

link default log

pdf stochvolt

Example

In the following example we specify the likelihood for the stochastic volatility model to be Student- t

```
n=1000
x = 0.1 * arima.sim(n = n, model = list(ar = 0.9))
y=exp(x/2)*rt(n,df=6)
time=1:n
data=data.frame(y,time)

formula=y~f(time, model="ar1")+1
result=inla(formula,family="stochvol.t",data=data)
## sometimes we need to add
## control.inla = list(cmin = 1e-2)
## to make it converge
hyper=inla.hyperpar(result)
```

Notes

None