Machine Learning and Forecasting Models

Part 2: Complete Subset Regression and Bayesian VAR

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Complete Subset Regression

- Example: HDeconometrics

```
library(HDeconometrics)
data(BRinf)
x=BRinf[,2:12]
y=BRinf[,1]
teste = csr(x, y, k=3, K=10, fixed.controls = 1)
pred = predict(teste,x)
```

Bayesian VAR

- lbvar package

```
library(devtools)
install_github("gabrielrvsc/lbvar")
```

- The package estimates the model, compute forecasts and impulse-response functions.

Bayesian - parametrization

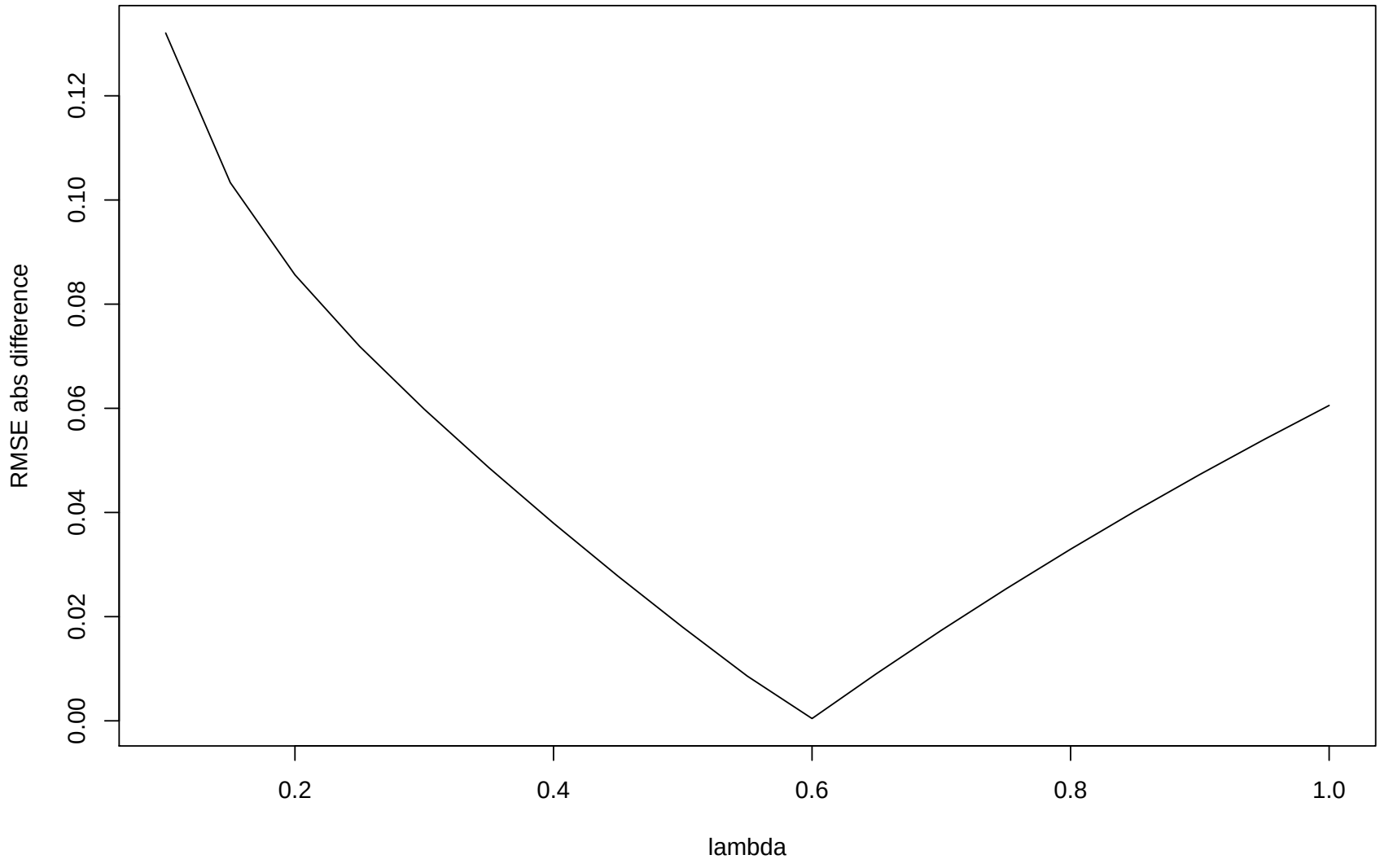
- Parameters:
  - δ: Controls the prior of the autoregressive terms. If it is 1 the prior is of a random wank and if it is 0 the prior is of a white noise.
  - λ: Controls the relative importance between the prior and the data. May be estimated using the fit.lambda function

```
library(lbvar)
library(tseries)
data("BNDESdata")

prior=apply(BNDESdata,2,function(x)pp.test(x)$p.value)
prior[prior>0.05]=1
prior[prior<=0.05]=0

lambda=fitLambda(BNDESdata,c("FBCF","DBNDES","IR"),seq(0.1,1,0.05),
                 p=13,p.reduced = 13,delta=prior)
```

VAR Bayesiano - parametrização



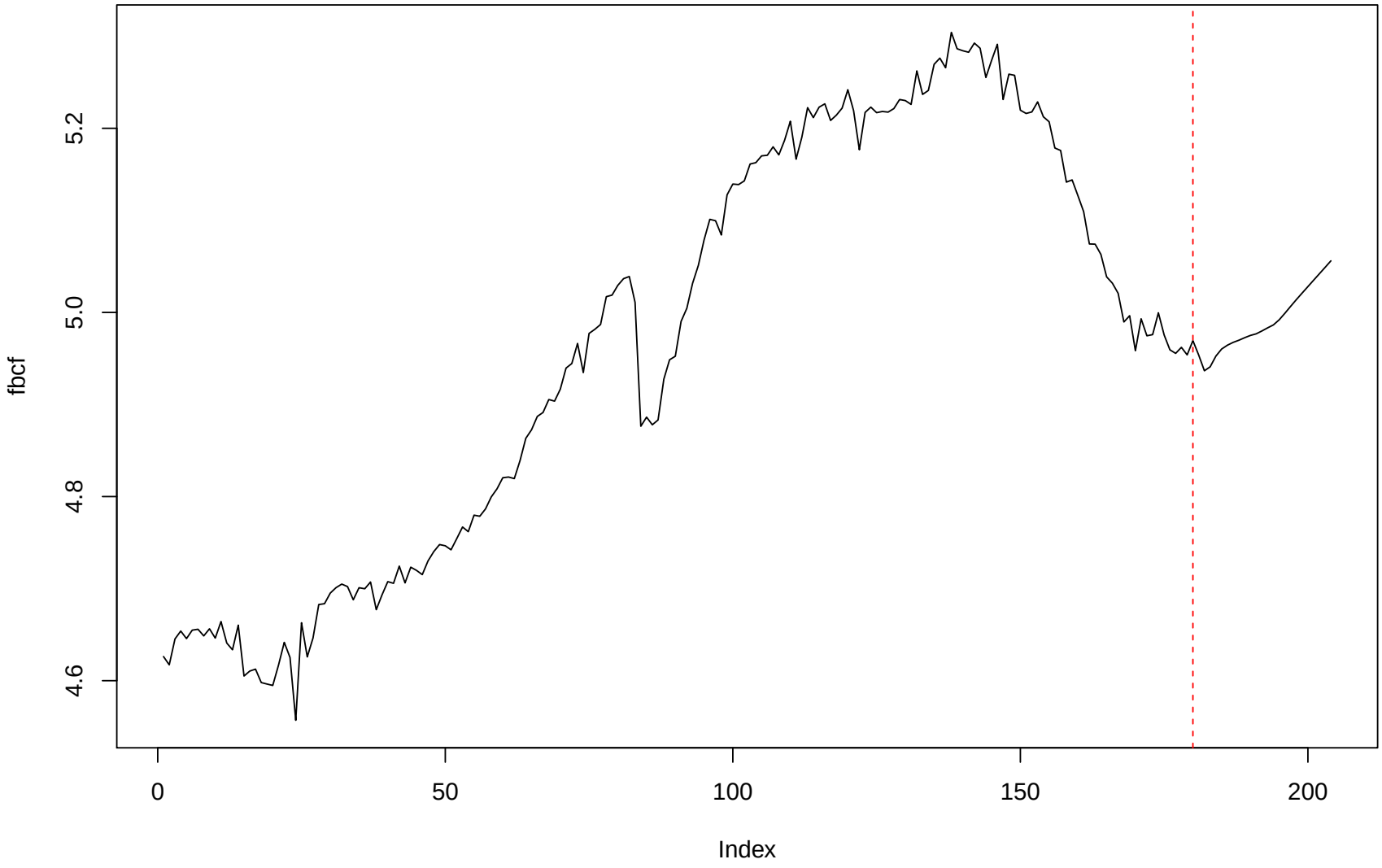
Bayesian VAR - Estimation and Forecasting

- Iterated forecasts are computed with the predict function. The horizon must be chosen.

```
model = lbvar(BNDESdata,13,delta = prior,lambda = lambda)
pred = predict(model,h=24)

fbcf=c(BNDESdata[,"FBCF"],pred[,"FBCF"])
plot(fbcf,type="l")
abline(v=nrow(BNDESdata),col=2,lty=2)
```

Bayesian VAR - Estimation and Forecasting



Bayesian VAR - Identification and Impulse-responses

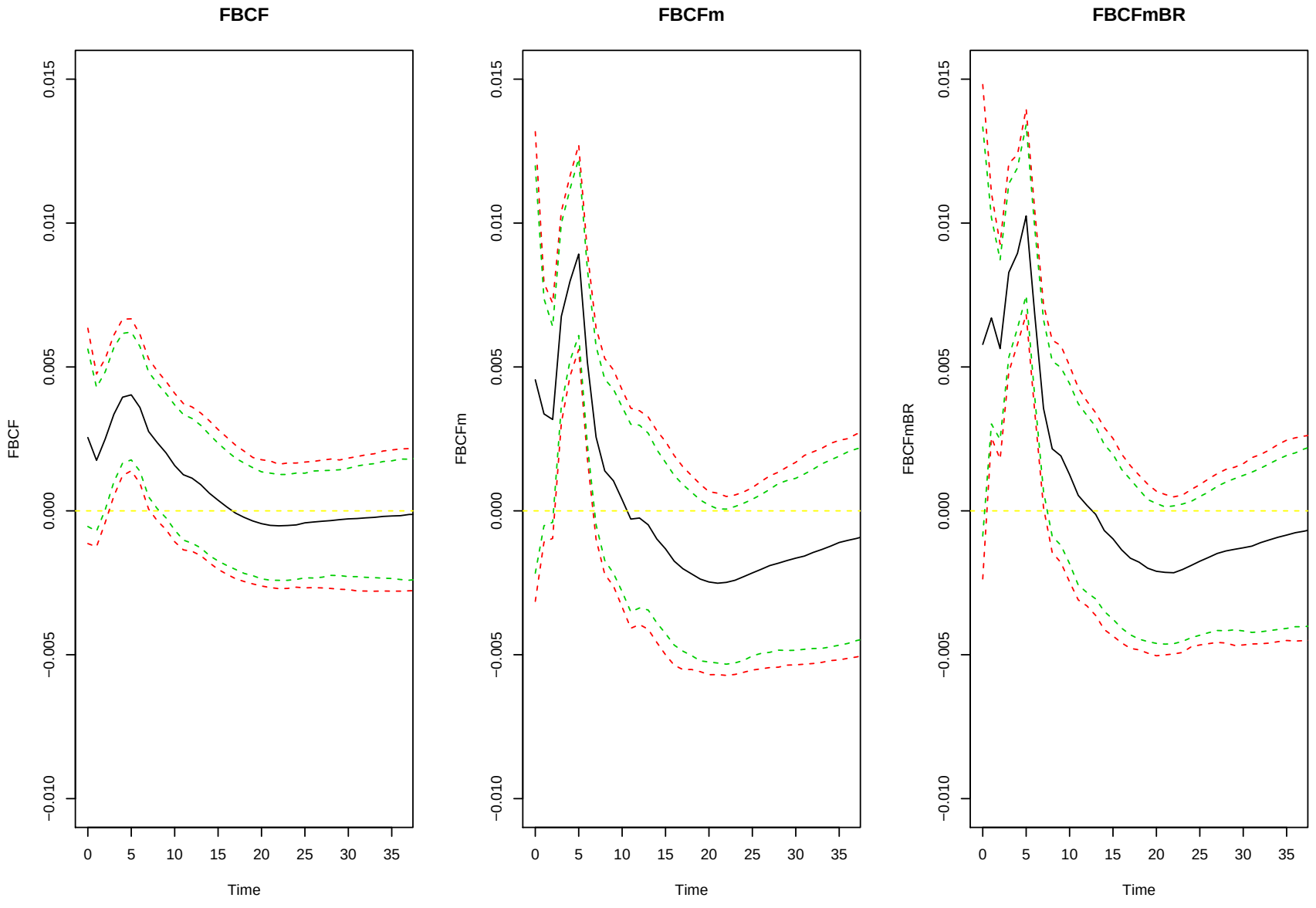
- Recursive Identification,
- Assumption: Variables must be orderes from the most exogenous to the most endogenous from the left to the right.
- Does not have contemporaneous simultaneous causality.

```
ident=identification(model)
set.seed(123)
ir=irf(model,ident,48,unity.shock = FALSE,M=1000)
```

Bayesian VAR - Identification and Impulse-responses

```
par(mfrow=c(1,3))
plot(ir,"DBNDES","FBCF",alpha=c(0.05,0.1),xlim=c(0,36),
     ylim=c(-0.01,0.015),ylab="FBCF",
     xlab="Time",main="FBCF")
plot(ir,"DBNDES","FBCFm",alpha=c(0.05,0.1),xlim=c(0,36),
     ylim=c(-0.01,0.015),ylab="FBCF",
     xlab="Time",main="FBCFm")
plot(ir,"DBNDES","FBCFmBR",alpha=c(0.05,0.1),xlim=c(0,36)
     ,ylim=c(-0.01,0.015),ylab="FBCF",
     xlab="Time",main="FBCFmBR")
```

Bayesian VAR - Identification and Impulse-responses



Bayesian VAR - Identification and Impulse-responses

```
par(mfrow=c(1,3))
plot(ir,"IR","FBCF",alpha=c(0.05,0.1),xlim=c(0,36),
     ylim=c(-0.01,0.005),ylab="FBCF",
     xlab="Time",main="Juros na FBCF")
plot(ir,"CG","FBCF",alpha=c(0.05,0.1),xlim=c(0,36),
     ylim=c(-0.002,0.003),ylab="Bens de Capital na FBCF",
     xlab="Time",main="FBCF")
plot(ir,"CG","DBNDES",alpha=c(0.05,0.1),xlim=c(0,36),
     ylim=c(-0.015,0.005),ylab="Bens de Capital no DBNDES",
     xlab="Time",main="DBNDES")
```

Bayesian VAR - Identification and Impulse-responses