Untitled

References:

- a overall R package could be used to do estimition, plot... see details in their paper, example section:
  - https://www.jstatsoft.org/article/view/v036i01/v36i01.pdf
  - https://rdrr.io/rforge/termstrc/man/
  - https://github.com/datarob/termstrc/tree/6b0701efa06776083285c5a74f17edbf1a656e0f/R
  - https://github.com/datarob/termstrc/tree/6b0701efa06776083285c5a74f17edbf1a656e0f/demo

```
#installation:
#library(devtools)
#install_github("datarob/termstrc")
# select install them all (number 13), install from source: yes
library('termstrc')
```

```
## Loading required package: Rcpp
```

```
## Warning: package 'Rcpp' was built under R version 3.4.4
```

```
## Loading required package: zoo
```

```
## Warning: package 'zoo' was built under R version 3.4.4
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: rgl
```

```
## Warning: package 'rgl' was built under R version 3.4.4
```

```
## Warning in rgl.init(initValue, onlyNULL): RGL: unable to open X11 display
```

```
## Warning: 'rgl_init' failed, running with rgl.useNULL = TRUE
```

```
## Loading required package: lmtest
```

```
## Warning: package 'lmtest' was built under R version 3.4.4
```

```
## Loading required package: RQuantLib
```

```
## Warning: package 'RQuantLib' was built under R version 3.4.4
```

```
oldpar <- par(no.readonly = TRUE)

data(govbonds)

ns_res <- estim_nss(govbonds, c("GERMANY", "AUSTRIA", "FRANCE"),matrange = c(0,30), method = "ns", tauc
```

```
## Warning in format.POSIXlt(as.POSIXlt(x), ...): unknown timezone 'zone/tz/
## 2018i.1.0/zoneinfo/Asia/Shanghai'
```

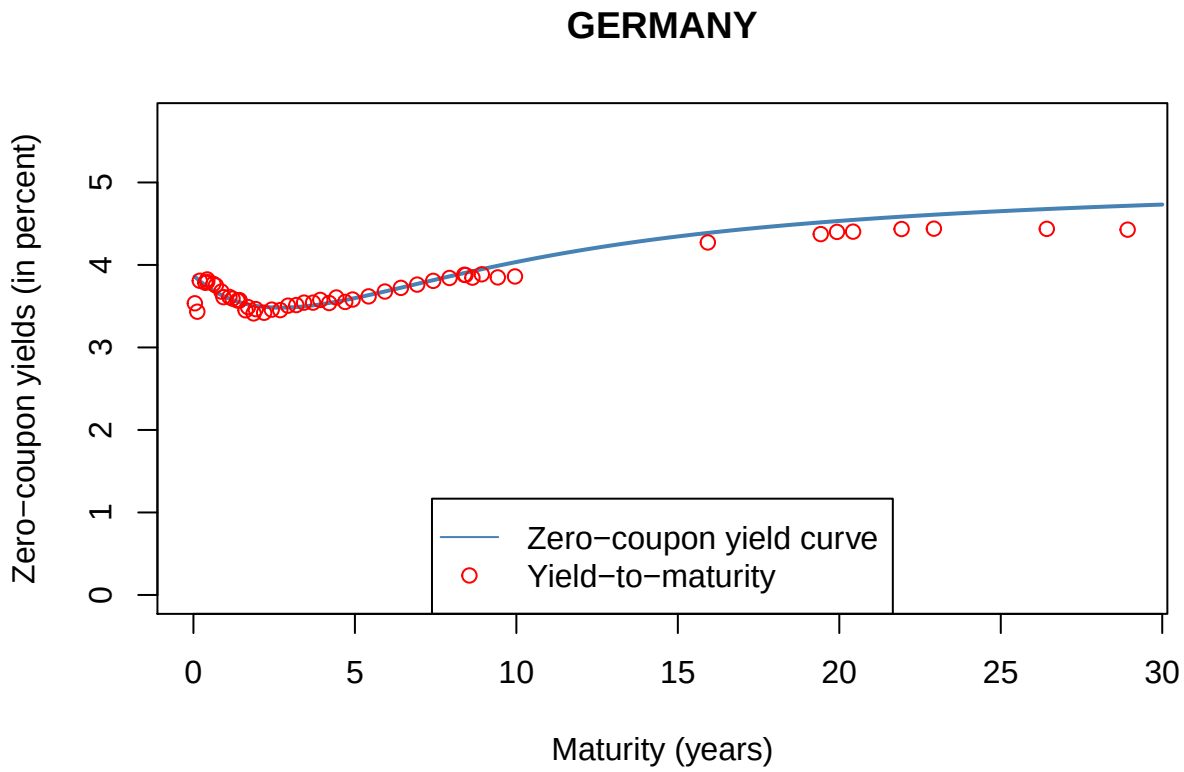
```
## [1] "Searching startparameters for  GERMANY"
##     beta0     beta1     beta2      tau1
##  5.137738 -1.270087 -3.220125  2.700100
## [1] "Searching startparameters for  AUSTRIA"
```

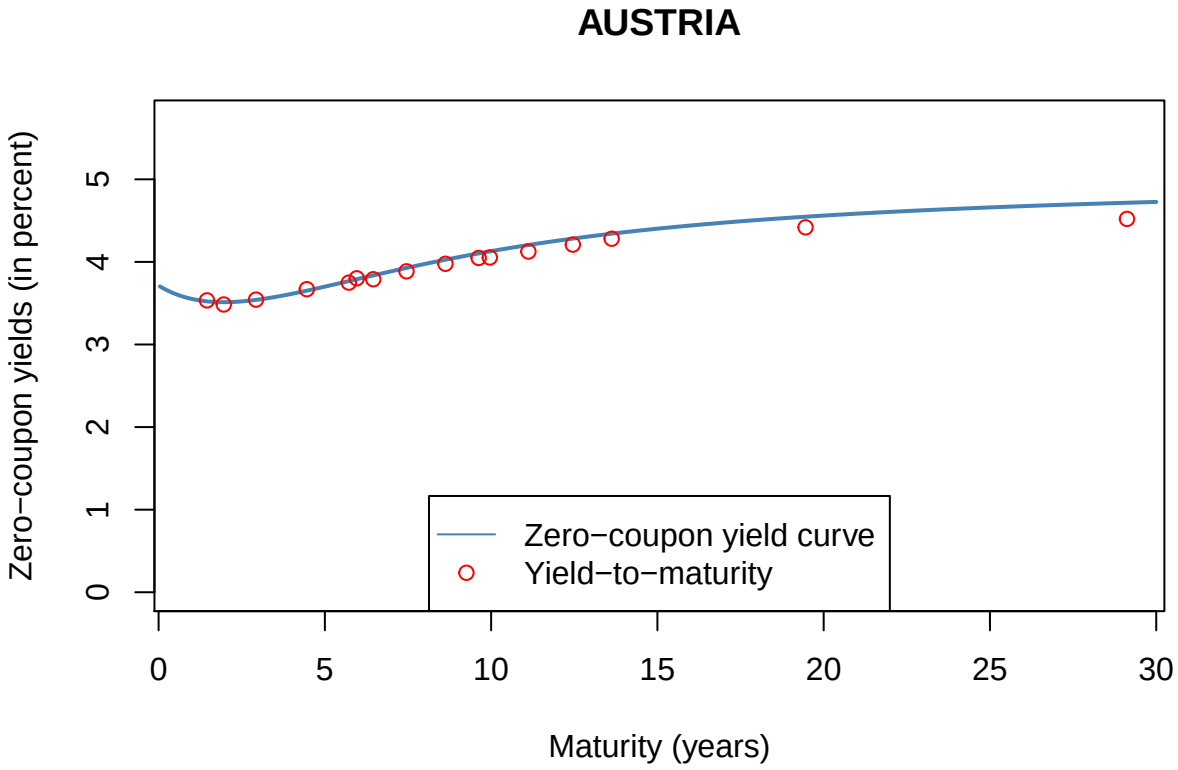
```
##      beta0     beta1     beta2      tau1
##   5.054148 -1.324985 -2.633244  2.500100
## [1] "Searching startparameters for  FRANCE"
##      beta0     beta1     beta2      tau1
##   5.113799 -1.213634 -3.079209  2.500100
```

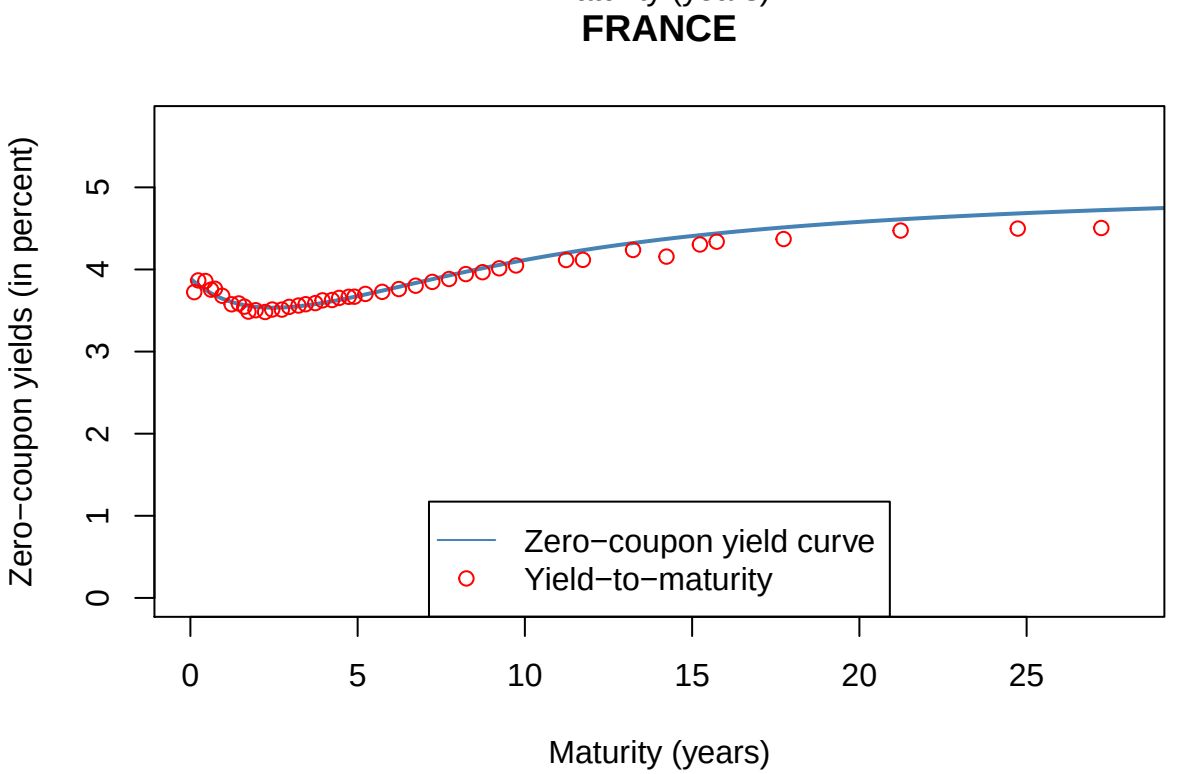
```
print(ns_res)
```

```
## ----------------------------------------------------
## Estimated Nelson/Siegel parameters:
## ----------------------------------------------------
##
##         GERMANY   AUSTRIA   FRANCE
## beta_0   5.13293   5.05877   5.12089
## beta_1  -1.25887  -1.34588  -1.23167
## beta_2  -3.23388  -2.59317  -3.05635
## tau_1    2.67816   2.53375   2.53120
```

```
plot(ns_res)
```





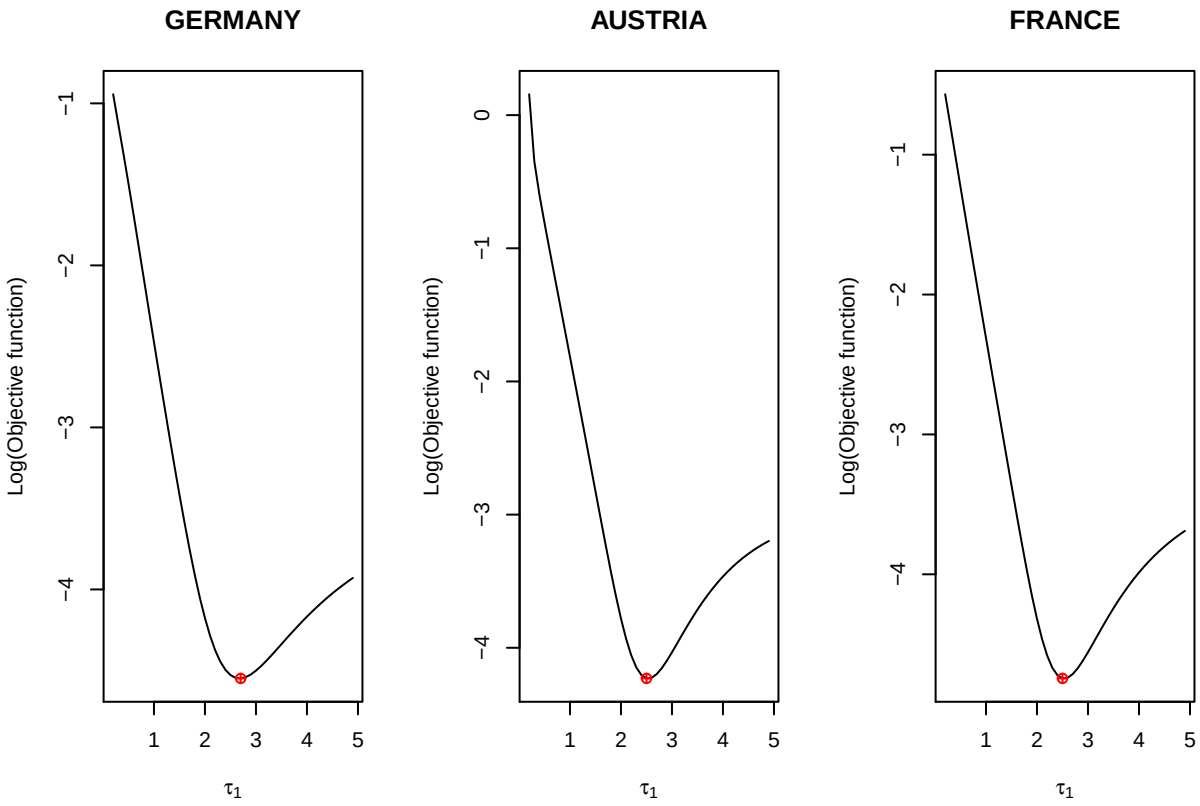



```
summary(ns_res)
```

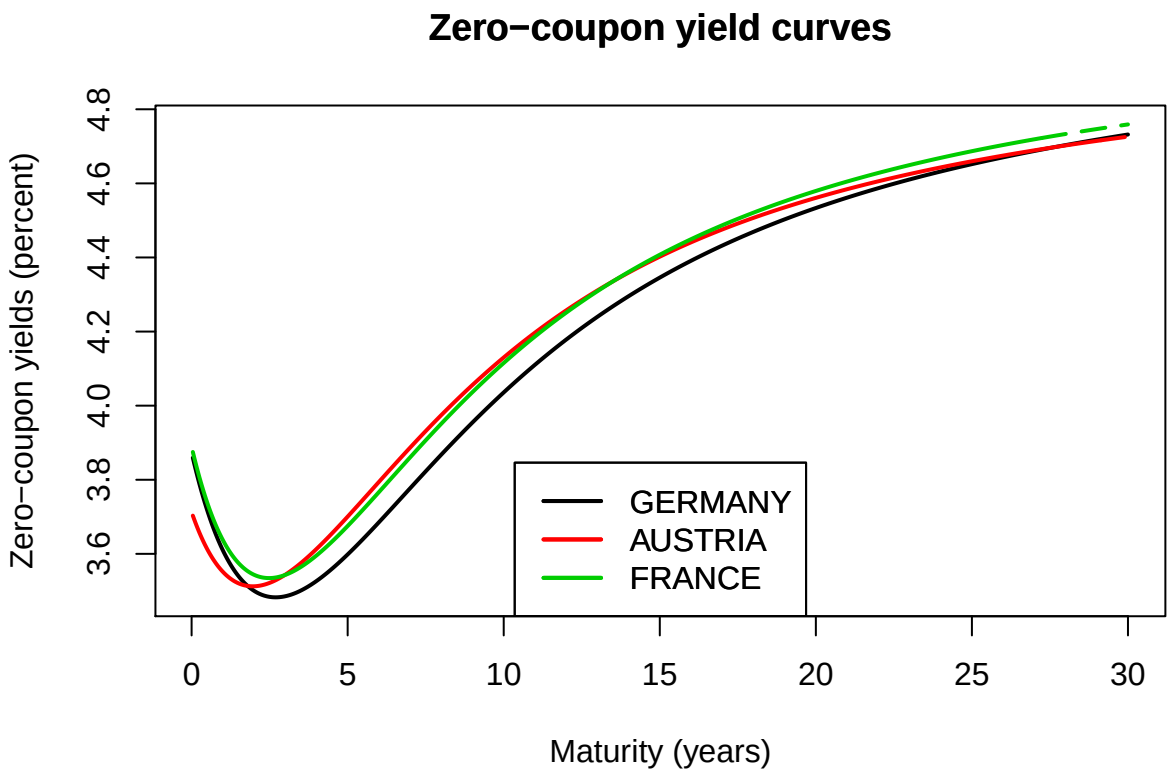
```
## ----------------------------------------------------
## Goodness of fit:
## ----------------------------------------------------
##
```

```
##                       GERMANY   AUSTRIA   FRANCE
## RMSE-Prices         0.3573824 0.1797342 0.2215853
## AABSE-Prices        0.1984912 0.1222489 0.1184535
## RMSE-Yields (in %)  0.0853813 0.0186552 0.0395518
## AABSE-Yields (in %) 0.0498930 0.0155757 0.0276744
##
##
## ----------------------------------------------------
## Startparameters:
## ----------------------------------------------------
##
##         beta0    beta1    beta2    tau1
## GERMANY  5.13774 -1.27009 -3.22013  2.70010
## AUSTRIA  5.05415 -1.32499 -2.63324  2.50010
## FRANCE   5.11380 -1.21363 -3.07921  2.50010
##
##
## ----------------------------------------------------
## Convergence information:
## ----------------------------------------------------
##
##         optim() convergence info
## GERMANY                        0
## AUSTRIA                        0
## FRANCE                         0
##
##         optim() solver message
## GERMANY NULL
## AUSTRIA NULL
## FRANCE  NULL
```

```r
## Plot startparameter grid search results
par(mfrow=c(1,3))
plot(ns_res$spsearch$GERMANY,main="GERMANY")
plot(ns_res$spsearch$AUSTRIA,main="AUSTRIA")
plot(ns_res$spsearch$FRANCE,main="FRANCE")
```




```
## Plot all yield curves in one figure
par(mfrow=c(1,1))
plot(ns_res,multiple=TRUE)
```

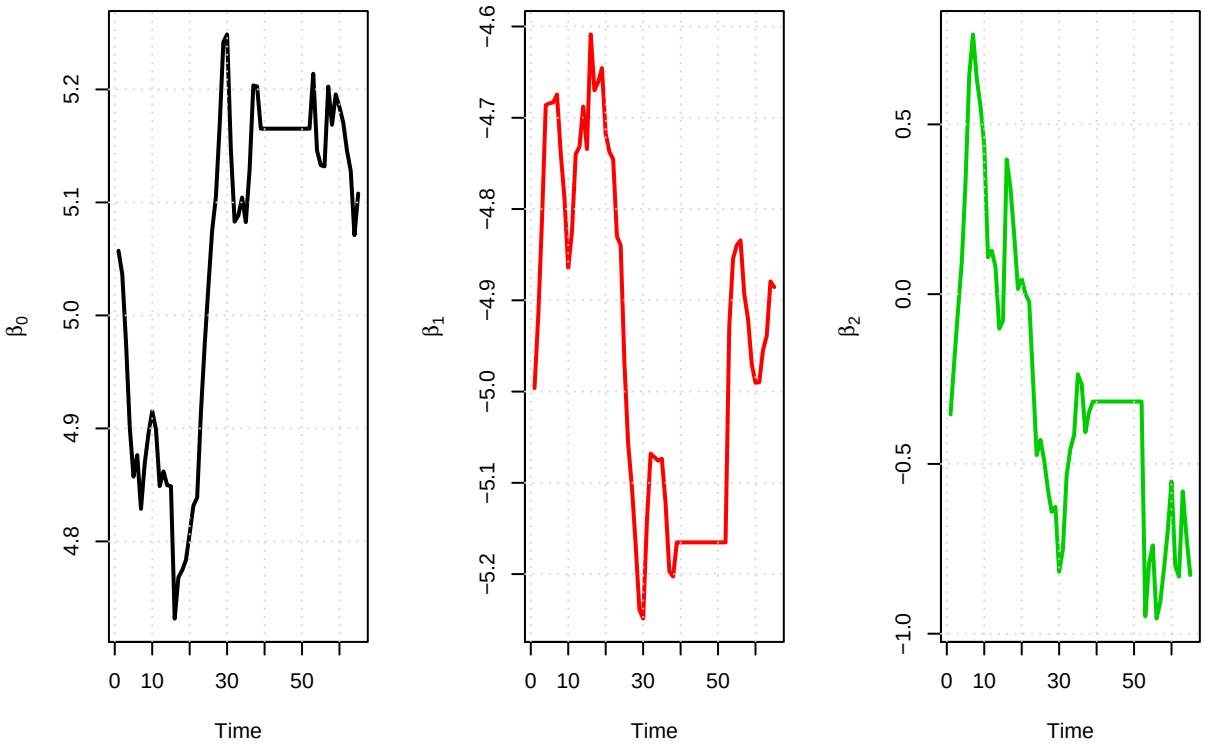


```r
par(oldpar)
```

```r
oldpar <- par(no.readonly = TRUE)

data(datadyncouponbonds)

## Diebold/Li estimation
dl_res <- estim_nss(datadyncouponbonds, c("GERMANY"), method = "dl", lambda = 1/3)
```

```
## [1] "Searching startparameters for  GERMANY"
## beta0 beta1 beta2
##     1     1     1
```

```r
## 3d yield curve plot
plot(dl_res)

## Estimated parameters
plot(param(dl_res))
```




```r
summary(param(dl_res))
```

```
## ------------------------------------------------
## ADF for GERMANY:
## ------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0     0.17399527         1        -1.61
## beta1    -0.05019533         1        -1.61
## beta2    -0.95548069         1        -1.61
##
## ------------------------------------------------
```

```
## ADF of differences for GERMANY:
## ------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      -4.703908         1        -1.61
## beta1      -4.346145         1        -1.61
## beta2      -6.048593         1        -1.61
##
## ------------------------------------------------
## Correlation of parameters for GERMANY:
## ------------------------------------------------
##            beta0      beta1      beta2
## beta0  1.0000000 -0.8729021 -0.7880086
## beta1 -0.8729021  1.0000000  0.5423442
## beta2 -0.7880086  0.5423442  1.0000000
##
## ------------------------------------------------
## Correlation of differences for GERMANY:
## ------------------------------------------------
##            beta0       beta1       beta2
## beta0  1.0000000 -0.67374656 -0.50273969
## beta1 -0.6737466  1.00000000  0.02799438
## beta2 -0.5027397  0.02799438  1.00000000
```

```
## Estimate Nelson/Siegel model
ns_res <- estim_nss(datadyncouponbonds, c("GERMANY"), method = "ns", tauconstr = list(c(0.2, 7, 0.2)), c
```

```
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.0673136 -5.0041697 -0.0561502  3.2001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.0433326 -4.9195823  0.0997459  3.2001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.97643754 -4.81118558 -0.04682344  3.00010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.90126837 -4.68613383  0.09437893  3.00010000
## [1] "Searching startparameters for  GERMANY"
##     beta0     beta1     beta2      tau1
##  4.855347 -4.690054  0.026080  2.800100
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.87855653 -4.70683150  0.01012561  2.60010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8381776 -4.7063511  0.1173892  2.6001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.87255945 -4.76090471 -0.01785748  2.60010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8953551 -4.8047992 -0.1036978  2.6001000
## [1] "Searching startparameters for  GERMANY"
```

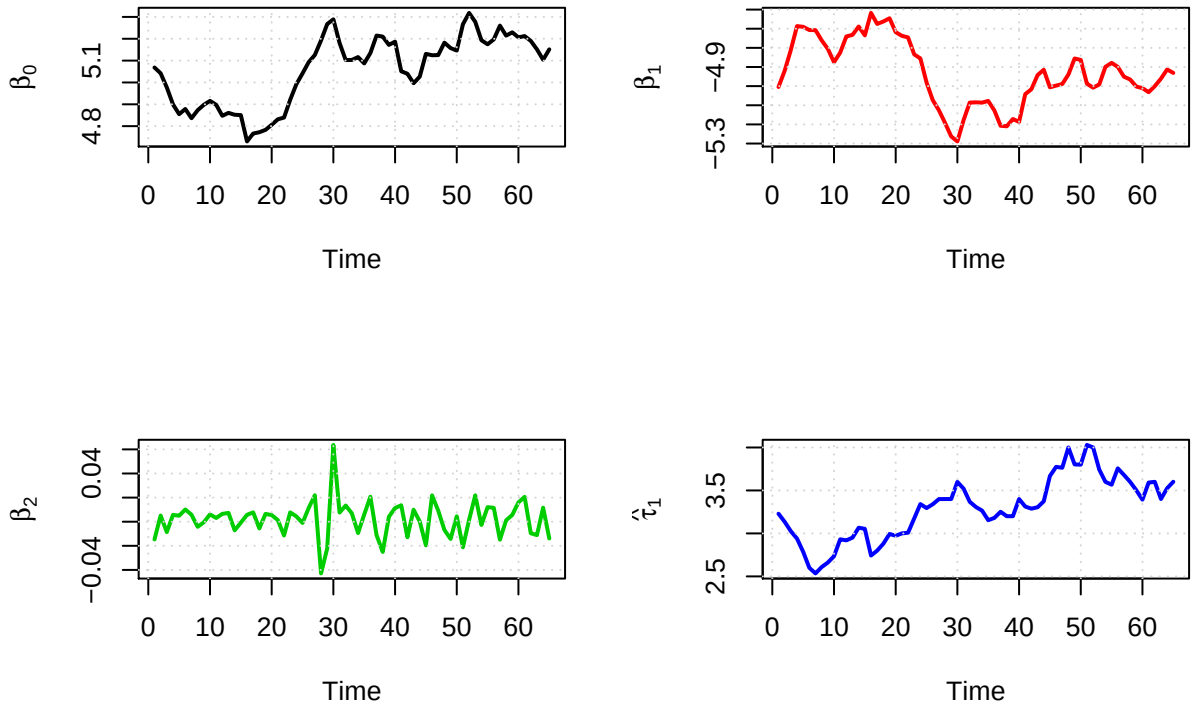
```
##      beta0      beta1      beta2       tau1
##  4.9170095 -4.8739946  0.1145886  2.8001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8992087 -4.8247622  0.1089711  3.0001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8488948 -4.7397740  0.1280416  3.0001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8619133 -4.7318409  0.0807114  3.0001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8497736 -4.6876586 -0.1016119  3.0001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.84877613 -4.73423147 -0.07796359  3.00010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.73162864 -4.61691962  0.09474872  2.80010000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  4.766236963 -4.675122071  0.007748483  2.800100000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.7690525 -4.6611107 -0.1263637  2.8001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.78340929 -4.64546266  0.01530102  3.00010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.80699054 -4.71767678  0.04508774  3.00010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.83141954 -4.73731244  0.00130707  3.00010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.8387802 -4.7453539 -0.0219623  3.0001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.92133946 -4.83427805  0.04432054  3.20010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  4.99285189 -4.85516915  0.08478758  3.40010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.0381368 -4.9790015 -0.1366419  3.2001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.09411758 -5.07268213  0.09902345  3.40010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.12610114 -5.12609885  0.02228053  3.40010000
## [1] "Searching startparameters for  GERMANY"
```

```
##       beta0       beta1       beta2        tau1
##  5.19235725 -5.19235721 -0.04292262  3.40010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.26731506 -5.26299535 -0.02213409  3.40010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.28890485 -5.28890483  0.06370372  3.60010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.1815286 -5.1776149  0.1193764  3.6001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.10284432 -5.08592600  0.05908352  3.40010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.1040425 -5.0841263  0.1427798  3.4001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.1146910 -5.0853436 -0.1082251  3.2001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.08779243 -5.07693977  0.07786326  3.20010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.13513469 -5.12721120  0.05024029  3.20010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.21338270 -5.20631701 -0.09156572  3.20010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.20989915 -5.20989913 -0.02509698  3.20010000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  5.171912496 -5.171912455  0.004077753  3.200100000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.18685371 -5.18685368  0.01138274  3.40010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.0518802 -5.0411112  0.1409495  3.4001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.0374997 -5.0145451 -0.1421527  3.2001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  4.9974148 -4.9415878  0.1461315  3.4001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.0270341 -4.9146492  0.0371412  3.4001000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.1287832 -5.0047918 -0.1072899  3.6001000
## [1] "Searching startparameters for  GERMANY"
```

```
##       beta0       beta1       beta2        tau1
##  5.12501656 -4.99741151  0.05431074  3.80010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.12597097 -4.98934594  0.05475298  3.80010000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  5.182150696 -4.939237283 -0.006797343  4.000100000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.15692817 -4.85531903 -0.01664364  3.80010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.14611491 -4.86319014  0.00446961  3.80010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.26501052 -4.98686585 -0.05495731  4.00010000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  5.318273883 -5.007845887  0.001556689  4.000100000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.27843584 -4.99159026  0.09405316  3.80010000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  5.193130842 -4.899108939 -0.002701613  3.600100000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.1755048 -4.8786637  0.0549246  3.6001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.19777863 -4.89965559  0.06429375  3.80010000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.2575529 -4.9489902 -0.1173244  3.6001000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  5.214281993 -4.965224703  0.001176693  3.600100000
## [1] "Searching startparameters for  GERMANY"
##      beta0      beta1      beta2       tau1
##  5.2304504 -5.0018158  0.1385659  3.6001000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.20640495 -5.01041468  0.02606716  3.40010000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.21248780 -5.03173397  0.03134584  3.60010000
## [1] "Searching startparameters for  GERMANY"
##        beta0        beta1        beta2         tau1
##  5.190173834 -5.000266175 -0.009566115  3.600100000
## [1] "Searching startparameters for  GERMANY"
##       beta0       beta1       beta2        tau1
##  5.15150963 -4.96099905 -0.01112054  3.40010000
## [1] "Searching startparameters for  GERMANY"
```

```
##      beta0      beta1      beta2       tau1
##   5.104452 -4.912472  0.111279  3.600100
## [1] "Searching startparameters for  GERMANY"
##        beta0       beta1       beta2        tau1
##   5.15137184 -4.93089581 -0.01527029  3.60010000
```

```
## Estimated parameters
plot(param(ns_res))
```




```
summary(param(ns_res))
```

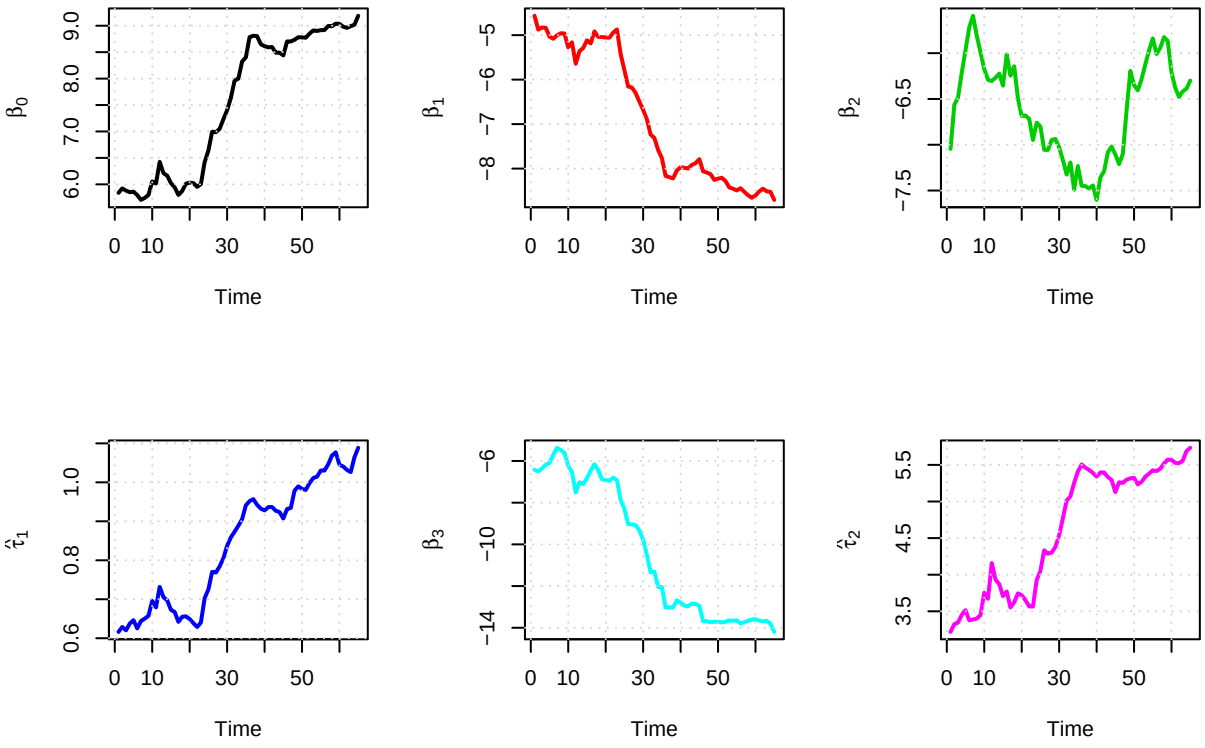
```
## ----------------------------------------------------
## ADF for GERMANY:
## ----------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      0.1982988         1        -1.61
## beta1      0.0185011         1        -1.61
## beta2     -8.5415720         1        -1.61
## tau1       0.2728809         1        -1.61
##
## ----------------------------------------------------
## ADF of differences for GERMANY:
## ----------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      -5.206123         1        -1.61
## beta1      -4.654775         1        -1.61
## beta2     -12.465429         1        -1.61
## tau1       -6.435402         1        -1.61
##
## ----------------------------------------------------
## Correlation of parameters for GERMANY:
```

```
## ------------------------------------------------------
##              beta0       beta1       beta2        tau1
## beta0  1.00000000 -0.82678105 -0.01869175  0.83606834
## beta1 -0.82678105  1.00000000 -0.02674132 -0.54137649
## beta2 -0.01869175 -0.02674132  1.00000000 -0.01769333
## tau1   0.83606834 -0.54137649 -0.01769333  1.00000000
##
## ------------------------------------------------------
## Correlation of differences for GERMANY:
## ------------------------------------------------------
##              beta0       beta1       beta2        tau1
## beta0  1.0000000 -0.85548608 -0.10808603  0.60759945
## beta1 -0.8554861  1.00000000  0.01471898 -0.42458090
## beta2 -0.1080860  0.01471898  1.00000000  0.03839149
## tau1   0.6075994 -0.42458090  0.03839149  1.00000000
```

```
## Estimate Svensson model
sv_res <- estim_nss(datadyncouponbonds, c("GERMANY"), method = "sv",tauconstr = list(c(0.2,7,0.2,0.5)))
```

```
## [1] "Searching startparameters for  GERMANY"
##     beta0     beta1     beta2      tau1     beta3      tau2
##  5.837288 -4.409704 -7.380830  0.600100 -6.463441  3.200100
```

```
## Plot start parameter grid search for t=1

## Estimated parameters
plot(param(sv_res))
```




```
summary(param(sv_res))
```

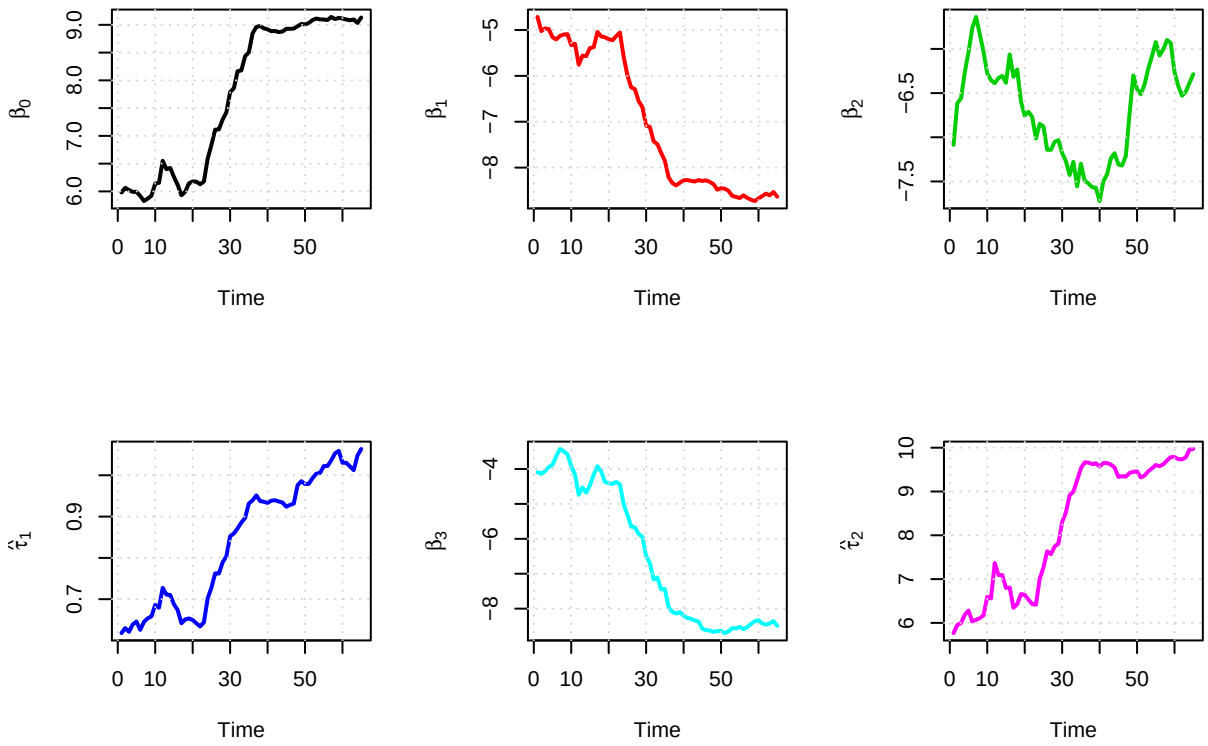
```
## ------------------------------------------------------
## ADF for GERMANY:
```

```
## ------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      2.1664579         1        -1.61
## beta1      2.1939615         1        -1.61
## beta2     -0.2445137         1        -1.61
## tau1       2.3645900         1        -1.61
## beta3      1.8990317         1        -1.61
## tau2       2.0584687         1        -1.61
##
## ------------------------------------------------
## ADF of differences for GERMANY:
## ------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      -2.899936         1        -1.61
## beta1      -3.374306         1        -1.61
## beta2      -4.674364         1        -1.61
## tau1       -3.222270         1        -1.61
## beta3      -3.206834         1        -1.61
## tau2       -3.666812         1        -1.61
##
## ------------------------------------------------
## Correlation of parameters for GERMANY:
## ------------------------------------------------
##            beta0      beta1      beta2       tau1      beta3       tau2
## beta0  1.0000000 -0.9978914 -0.2464053  0.9865925 -0.9964883  0.9913969
## beta1 -0.9978914  1.0000000  0.2006855 -0.9911212  0.9917105 -0.9906802
## beta2 -0.2464053  0.2006855  1.0000000 -0.1187700  0.2588707 -0.2803217
## tau1   0.9865925 -0.9911212 -0.1187700  1.0000000 -0.9780610  0.9802712
## beta3 -0.9964883  0.9917105  0.2588707 -0.9780610  1.0000000 -0.9850851
## tau2   0.9913969 -0.9906802 -0.2803217  0.9802712 -0.9850851  1.0000000
##
## ------------------------------------------------
## Correlation of differences for GERMANY:
## ------------------------------------------------
##            beta0      beta1       beta2       tau1      beta3        tau2
## beta0  1.0000000 -0.9170321 -0.22181882  0.7345493 -0.9327404  0.85383544
## beta1 -0.9170321  1.0000000 -0.10412102 -0.7636326  0.7835999 -0.86007660
## beta2 -0.2218188 -0.1041210  1.00000000  0.2166913  0.3727381  0.00102688
## tau1   0.7345493 -0.7636326  0.21669128  1.0000000 -0.6114293  0.84304852
## beta3 -0.9327404  0.7835999  0.37273809 -0.6114293  1.0000000 -0.76381667
## tau2   0.8538354 -0.8600766  0.00102688  0.8430485 -0.7638167  1.00000000
```

```
## Estimate Adjusted Svensson model
asv_res <- estim_nss(datadyncouponbonds, c("GERMANY"), method = "asv",tauconstr = list(c(0.2,10,0.2)))
```

```
## [1] "Searching startparameters for  GERMANY"
##     beta0     beta1     beta2      tau1     beta3      tau2
##  5.911611 -4.547495 -7.235422  0.600100 -4.030923  5.600100
```

```
## Estimated parameters
plot(param(asv_res))
```

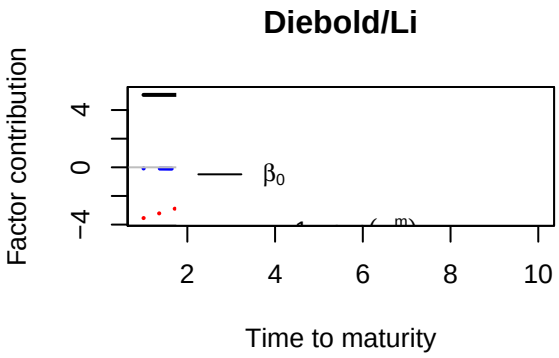


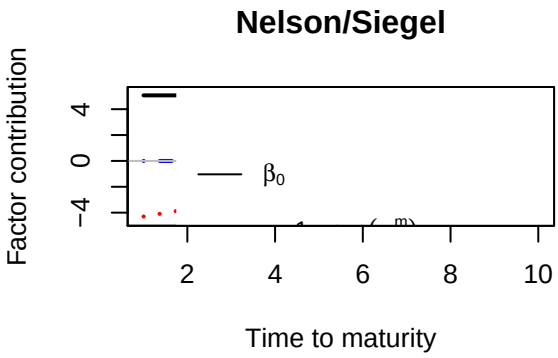

```
summary(param(asv_res))
```

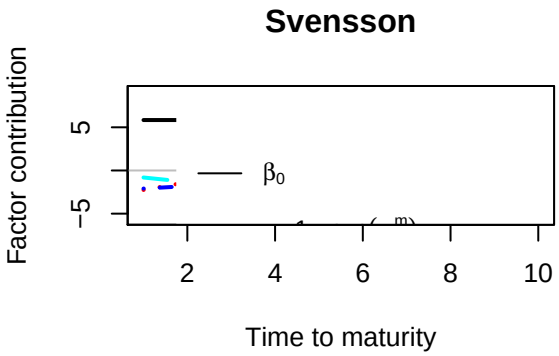
```
## ------------------------------------------------
## ADF for GERMANY:
## ------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      1.9835955         1        -1.61
## beta1      2.0827642         1        -1.61
## beta2     -0.2716117         1        -1.61
## tau1       2.3280928         1        -1.61
## beta3      1.6685788         1        -1.61
## tau2       2.0063286         1        -1.61
##
## ------------------------------------------------
## ADF of differences for GERMANY:
## ------------------------------------------------
##
##       Test statistic Lag order p-value-5pct
## beta0      -2.644158         1        -1.61
## beta1      -3.144946         1        -1.61
## beta2      -4.525425         1        -1.61
## tau1       -3.284992         1        -1.61
## beta3      -3.015689         1        -1.61
## tau2       -3.388359         1        -1.61
##
## ------------------------------------------------
## Correlation of parameters for GERMANY:
## ------------------------------------------------
##             beta0      beta1      beta2       tau1      beta3       tau2
## beta0  1.0000000 -0.9978616 -0.2839007  0.9839699 -0.9965059  0.9905425
```

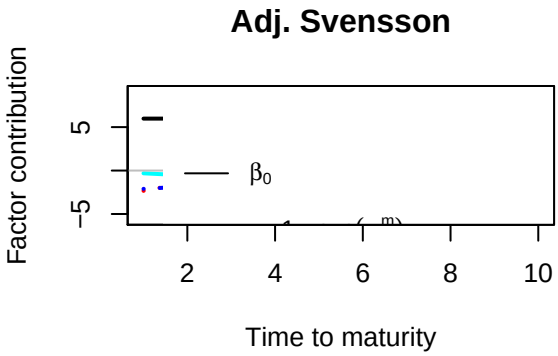
```
## beta1 -0.9978616  1.0000000  0.2371384 -0.9893441  0.9916111 -0.9901973
## beta2 -0.2839007  0.2371384  1.0000000 -0.1458527  0.2977605 -0.3087844
## tau1   0.9839699 -0.9893441 -0.1458527  1.0000000 -0.9741710  0.9798460
## beta3 -0.9965059  0.9916111  0.2977605 -0.9741710  1.0000000 -0.9833709
## tau2   0.9905425 -0.9901973 -0.3087844  0.9798460 -0.9833709  1.0000000
##
## ----------------------------------------------------
## Correlation of differences for GERMANY:
## ----------------------------------------------------
##            beta0      beta1        beta2       tau1      beta3
## beta0  1.0000000 -0.9047535 -0.241292500  0.6904625 -0.9259813
## beta1 -0.9047535  1.0000000 -0.107663656 -0.7192539  0.7618230
## beta2 -0.2412925 -0.1076637  1.000000000  0.2241513  0.3860546
## tau1   0.6904625 -0.7192539  0.224151285  1.0000000 -0.5606101
## beta3 -0.9259813  0.7618230  0.386054563 -0.5606101  1.0000000
## tau2   0.8204598 -0.8207874 -0.003439044  0.8196895 -0.7208463
##               tau2
## beta0  0.820459772
## beta1 -0.820787366
## beta2 -0.003439044
## tau1   0.819689493
## beta3 -0.720846344
## tau2   1.000000000
```

```
## Factor contributions at t=1
par(mfrow=c(2,2))
fcontrib(param(dl_res), index = 1, method="dl")
fcontrib(param(ns_res), index = 1, method="ns")
fcontrib(param(sv_res), index = 1, method="sv")
fcontrib(param(asv_res), index = 1, method="asv")
```










```
## Compare GOF
allgof <- cbind(summary(dl_res)$gof, summary(ns_res)$gof, summary(sv_res)$gof, summary(asv_res)$gof)
colnames(allgof) <- c("Diebold/Li", "Nelson/Siegel", "Svensson", "Adj. Svensson")
print(allgof)
```

```
##                     Diebold/Li Nelson/Siegel     Svensson Adj. Svensson
## RMSE-Prices         0.35044445   0.187700352 0.0309542460  0.0309909586
## AABSE-Prices        0.20751976   0.150186812 0.0228885405  0.0229031890
## RMSE-Yields (in %)  0.06967524   0.052810624 0.0118763734  0.0118974664
## AABSE-Yields (in %) 0.00485464   0.002788962 0.0001410482  0.0001415497
```

```
par(oldpar)
```