# HMM S&P 500

HMM example using S&P 500 data which is included in the depmix54 package. The sp500 data consists of monthly values of the S&P 500 index. The logret column, column 6, is the log of the ratio of the closing indices.

```
library(depmixS4)
```

```
## Warning: package 'depmixS4' was built under R version 4.0.2
```

```
## Loading required package: nnet
```

```
## Loading required package: MASS
```

```
## Loading required package: Rsolnp
```

```
## Warning: package 'Rsolnp' was built under R version 4.0.2
```

```
## Loading required package: nlme
```

```
data(sp500)
head(sp500)
```

```
##               Open  High   Low Close  Volume        logret
## 1950-02-28 17.22 17.22 17.22 17.22 1310000  0.009921295
## 1950-03-31 17.29 17.29 17.29 17.29 1880000  0.004056801
## 1950-04-28 17.96 17.96 17.96 17.96 2190000  0.038018763
## 1950-05-31 18.78 18.78 18.78 18.78 1530000  0.044645411
## 1950-06-30 17.69 17.69 17.69 17.69 2660000 -0.059792966
## 1950-07-31 17.84 17.84 17.84 17.84 1590000  0.008443619
```

```
range(sp500[,6])
```

```
## [1] -0.2454280  0.1510432
```

Column 6 has a range of [-0.245, 0.15]

```
# create the model, then fit
mod <- depmix(logret~1, nstates=2, data=sp500)
set.seed(1)
fmod <- fit(mod)
```

```
## converged at iteration 85 with logLik: 1334.635
```

```
# plot
par(mfrow=c(3,1))
plot(posterior(fmod)[,1], type='l')
plot(posterior(fmod)[,2], type='l')
plot(sp500[,6], type='l')
```