Advanced Time Series Analysis: Computer Exercise 2

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Part 1

There are simulated $n = 3000$ where $\epsilon_t \sim \mathcal{N}(0,\, 1)$. ϵ_t is used as noise input for all simulations in part one.

The equation below shows the used parameters in the SETAR(2,1,1). Let us call eq. 1 and eq. 2 parameter set one (par_1).

$$a_0 = [0.125, -0.125] \tag{1}$$

$$a_1 = [0.6, -0.4] \tag{2}$$

Simulation of the SETAR(2,1,1)

The Self-Exciting Threshold AR (SETAR) model is given by eq. 3.

$$X_t = a_0^{(J_t)} + \sum_{i=1}^{k_{(J_t)}} a_i^{(J_t)} X_{t-i} + \epsilon^{(J_t)} \tag{3}$$

where J_t are regime processes. The complete model are defined in eq. 4.

$$X_t = \begin{Bmatrix} a_{0,1} + a_{1,1} X_{t-1} + \epsilon_t & for & X_{t-1} \leq 0 \\ a_{0,2} + a_{1,2} X_{t-1} + \epsilon_t & for & X_{t-1} > 0 \end{Bmatrix} \tag{4}$$

The model X_t (eq. 4) has been simulated with par_1. Its simulation is plotted in fig. **??**.

Estimate the parameters using conditional least squares

see section 5.5 page 115

```
RSSSetar <- function(theta) {
    p1 <- theta[1]
    p2 <- theta[2]

    ## Calculate the objective function value
    obj <- 1

    #
    return(obj)
}
```

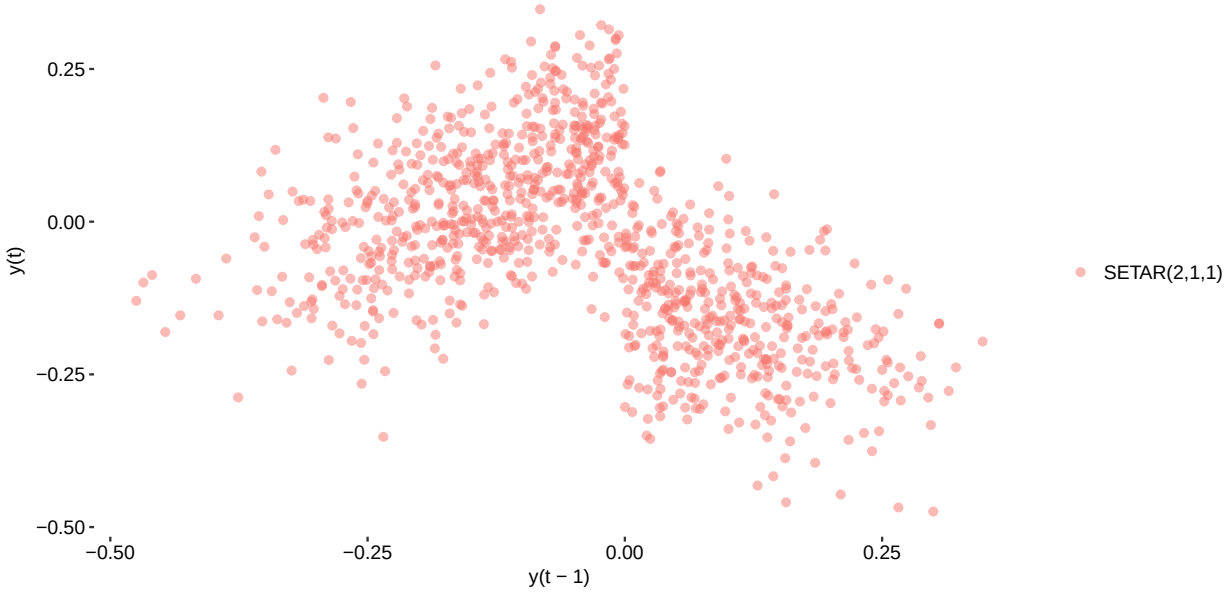

Figure 1: Two simulated SETAR(2,1,1) models using par_1 and par_2.