

# Homework 9 - Predictive Modeling in Finance and Insurance

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```
cbeDat <- read.table("cbe.dat", header = TRUE)
```

## 1. Exploratory Time Series Analysis

## 2. Sample Autocorrelation

The sample lag 2 autocorrelation formula is as follows:

$$\hat{\rho}_2 = \frac{\sum_{t=3}^T (y_t - \bar{y})(y_{t-2} - \bar{y})}{\sum_{t=1}^T (y_t - \bar{y})^2}$$

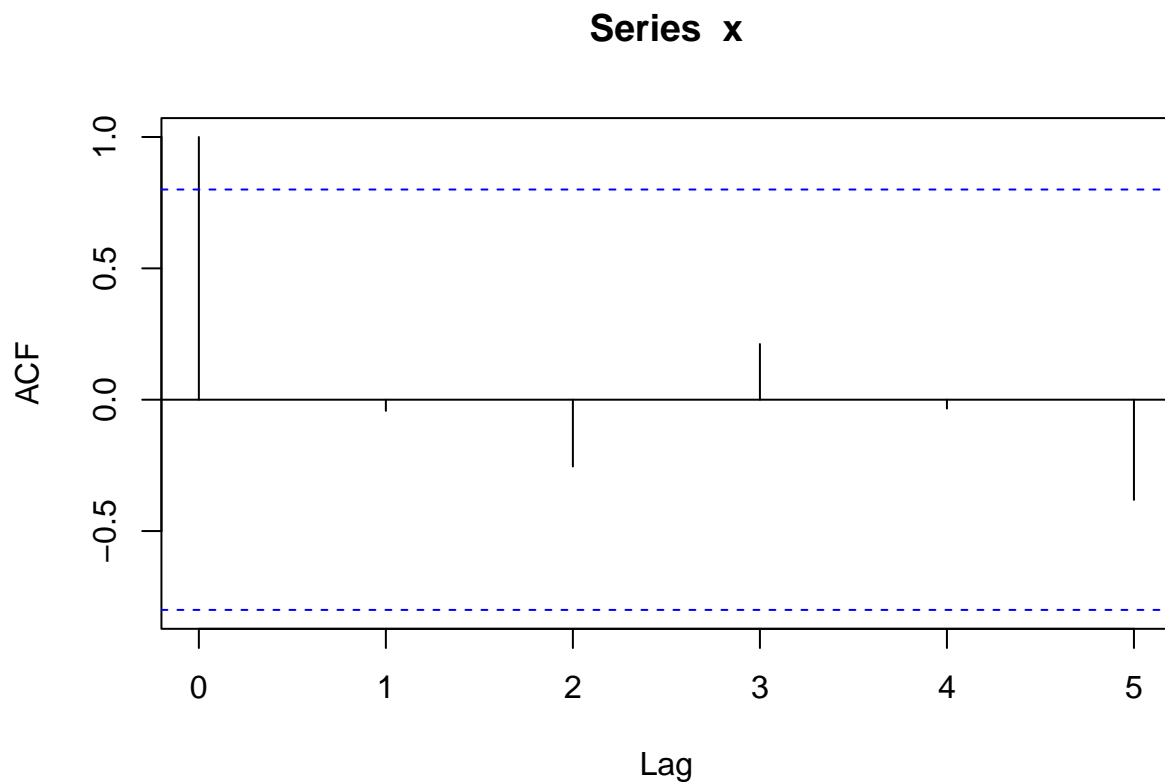
Note that  $\bar{y} = \frac{1+1.5+1.6+1.4+1.5+1.7}{6} = 1.45$ . So, I calculate, using the numbers given:

$$\begin{aligned}\hat{\rho}_2 &= \frac{(1.6 - 1.45)(1 - 1.45) + (1.4 - 1.45)(1.5 - 1.45) + (1.5 - 1.45)(1.6 - 1.45) + (1.7 - 1.45)(1.4 - 1.45)}{(1 - 1.45)^2 + (1.5 - 1.45)^2 + (1.6 - 1.45)^2 + (1.5 - 1.45)^2 + (1.7 - 1.45)^2} \\ &= \frac{-0.075}{0.2925} = -0.2564\end{aligned}$$

```
x <- c(1,1.5,1.6,1.4,1.5,1.7)
lagx2 <- c(1,1.5,1.6,1.4)
currx2 <- c(1.6,1.4,1.5,1.7)
print(cor(lagx2,currx2))
```

```
## [1] -0.4417926
```

```
acf(x)[2]
```



```
##
## Autocorrelations of series 'x', by lag
##
##      2
## -0.254
```

3. Forecast error
4. Forecast for AR(1) model
5. Time Series, AutoRegression, GLS