11.2: Autocorrelation in Errors
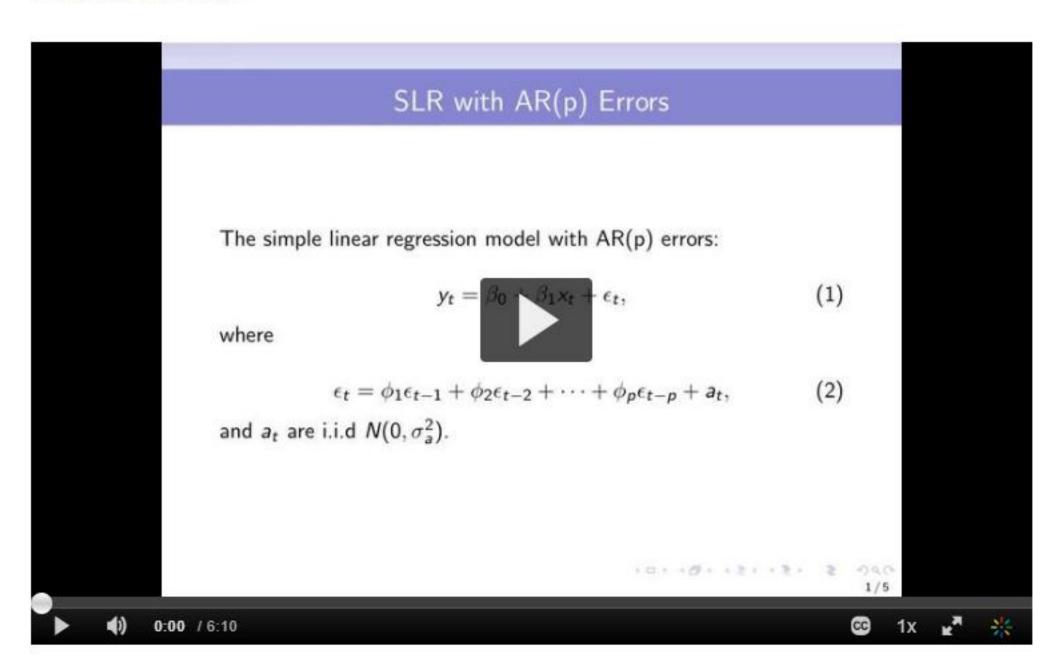
11.2: Autocorrelation in Errors

Read Sections 14.1 and 14.2 of your textbook. As you read, take notes on the following.

1 Describe, in your own words, when observations and errors may not be independent in data.

2 What are the consequences in ordinary least squares regression when the errors are autocorrelated?

3 How are residual plots used to detect autocorrelation in the errors?

4 Consider the simple linear regression model with first-order autoregressive (AR) errors. (a) Write down the model. (b) What are the expected value, the variance, and the covariance of the error terms? (c) What is the autocorrelation between two error terms that are k periods apart?

5 How is a partial autocorrelation function (PACF) plot used to detect autocorrelation in the errors?

Watch this video to see how a PACF plot is used to detect autocorrelation in the residuals, and the appropriate order to model the AR errors.

SLR with AR(p) Errors

The simple linear regression model with AR(p) errors:

$$y_t = \beta_0 + \beta_1 x_t + \epsilon_t, \qquad (1)$$

where

$$\epsilon_t = \phi_1 \epsilon_{t-1} + \phi_2 \epsilon_{t-2} + \cdots + \phi_p \epsilon_{t-p} + a_t, \qquad (2)$$

and a_t are i.i.d $N(0, \sigma_a^2)$.

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   Slides to accompany the "PACF Plot" video