Autoregressions: Problems

Suppose that you estimate the following AR(1) process:

$$y_t = \alpha + \beta y_{t-1} + e_t \tag{1}$$

1. Yes. If the absolute value of β is greater than one, then (1) is a non-stationary process. This suggests that y_t should be transformed (e.g. differenced) to make it stationary.?

2. No. No particular value of the constant is problematic.

3. $E_t[y_{t+1}] = \alpha + \beta y_t$. This assumes that y_t is known in period t.

4. We assume that α and β are uncorrelated. Thus:

$$Var(y_{t+1}) = St.Err._{\alpha}^{2}\alpha^2 + St.Err._{\beta}^{2}y_t^2 + Var(e_t) \tag{2}$$

Plus or minus 1.96 standard deviations would then constitute the 95% confidence interval. Discuss how you would obtain error bands for this forecast.

Suppose that you estimate the following AR(2) process:

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + e_t \tag{3}$$

5. $E_t[y_{t+1}] = \alpha + \beta_1 y_t + \beta_2 y_{t-1}$

6. The most common approach is to run the autoregression for several different lag lengths and then choose among them using an information criteria..

7. The autorgressive distributive lag model includes exogenous regressors beyond just lags. The estimation is done in the same way. Forecasting, however, is complicated because we may need to also make forecasts of the exogenous variables.