Chapter 5 Models for nonstationary time series

5.7 Consider two models:

A: $Y_t = 0.9Y_{t-1} + 0.09Y_{t-2} + e_t$.

B: $Y_t = Y_{t-1} + e_t - 0.1e_{t-1}$.

(a) Identify each as a specific ARIMA model. That is, what are p, d, and q and what are the values of the parameters, ϕ's and θ's?

(b) In what ways are the two models different?

(c) In what ways are the two models similar? (Compare ψ-weights and π-weights.)

Solution: (c) Hints: Using Equations (4.3.21) on page 75, you can calculate the ψ-weights for the AR(2) model. From Equation (5.2.6), page 93, you can calculate the ψ-weights for the IMA(1,1) model. By comparing the ψ-weights of the two models, you will find the ψ-weights for the two models are very similar for many lags.

Similarly, the π-weights for the IMA(1,1) model can be obtained from Equation (4.5.5), page 80, where the π-weights for the IMA(1,1) model are the coefficients of the AR model transformed by the IMA(1,1) model. The first two π-weights for the two models are identical and the remaining π-weights are nearly the same. These two models would be essentially impossible to distinguish in practice.

For (c), you have to write R codes or other codes to calculate the ψ-weights of the two models and the π-weights for the IMA(1,1) model.

5.10 Nonstationary ARIMA series can be simulated by first simulating the corresponding stationary ARMA series and then "integrating" it (really partially summing it). Use statistical software to simulate a variety of IMA(1,1) and IMA(2,2) series with a variety of parameter values. Note any stochastic "trends" in the simulated series.

Chapter 6 Model Specification

6.15 The sample ACF for a series and its first difference are given in the following table. Here $n = 100$.

lag	1	2	3	4	5	6
ACF for Y_t	0.97	0.97	0.93	0.85	0.80	0.71
ACF for ∇Y_t	–0.42	0.18	–0.02	0.07	–0.10	–0.09

Based on this information alone, which ARIMA model(s) would we consider for the series?

6.16 For a series of length 64, the sample partial autocorrelations are given as:

Lag	1	2	3	4	5
PACF	0.47	–0.34	0.20	0.02	–0.06

Which models should we consider in this case?

Pls submit your assignments before class on (Tuesday) 19 OCT