ECON 4160: Seminars autumn semester 2013—SIXTH SEMINAR

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November 14, 2013

Exercise set to seminar 6 (Monday 25/11)

1. Assume $Y_t \sim AR(p)$, with a deterministic trend, and that the characteristic equation of the associated homogenous difference equation has all its roots inside the unit circle. How is the analysis of the dynamic multipliers affected by the presence of a deterministic trend?

2. Assume that

   $$Y_t = \phi_0 + \phi_1 Y_{t-1} + \varepsilon_t \tag{1}$$

   where ε_t is white-noise with a constant variance σ^2.

   (a) Show that the solution for Y_t is without a time trend when $-1 < \phi_1 < 1$, but that it contains a time trend when $\phi_1 = 1$.

   (b) Give the expressions for $Var(Y_t \mid Y_0)$ for the cases of $-1 < \phi_1 < 1$ and $\phi_1 = 1$.

   (c) Based on your answers to (a) and (b), what will be the typical forecasts for Y_{T+h} $(h = 1, 2, \ldots, H)$, and what will be the typical shape of the prediction interval in these two cases? Assume $\phi_0 > 0$.

3. An important question in macroeconomics is whether GDP per capita is an integrated series or a series which is trend-stationary. Investigate this question empirically for Norway by using the annual data series *BNPcap* that you find in the file *BNPcap.xls*. The data are observations of Norwegian GDP in fixed 2010 prices for the period 1835-2012.

4. Consider the data set used in Seminar 4 Question 5.

   Assume that you do not know i) that X_t and Y_t are generated as non-stationary ($I(1)$) variables, ii) that X_t and Y_t are cointegrated, and iii) that X_t is weakly exogenous for the cointegration parameter.

   Show how you can test econometrically i), ii) and iii). What would your conclusions be?