MACROECONOMETRÍA

Segundo Cuatrimestre (curso 2007/08), Depto. de Economía, UC3M

Excercise set 2

Question 1. Let *cons* denote the logarithm of your seasonally unadjusted consumption series in EViews. The command

```
equation eq01.ls d(cons) c @seas(2) @seas(3) @seas(4)
```

estimates the model

$$\Delta cons_t = \beta_0 + \beta_1 q_{t(2)} + \beta_1 q_{t(3)} + \beta_1 q_{t(4)} + e_t,$$

where $q_{t(2)}$, $q_{t(3)}$ and $q_{t(4)}$ are seasonal dummies for the second, third and fourth quarters, respectively. The code

```
eq01.fit dcons_fit
series dcons_adj = d(cons) - dcons_fit
```

creates a seasonally adjusted version of $\Delta cons_t$ called dcons_adj. This means the series dcons_adj can be tested for stationarity using the Augmented Dickey-Fuller (ADF) test, and the code below runs three such tests. Run the same code on your own seasonally adjusted consumption growth series. (Alternatively, make a similar program in your preferred software and then run it.) Provide the Teaching Assistant (TA) with a summary of the tests. Do the tests suggest your seasonally adjusted consumption growth series is stationary?

```
'test for unit root (no constant, no trend):
dcons_adj.uroot(adf,dif=1,lag=j)

'test for unit root (constant, but no trend):
dcons_adj.uroot(adf,dif=1,const,lag=j)

'test for unit root (constant and trend):
dcons_adj.uroot(adf,dif=1,const,trend,lag=j)
```

Question 2. Let y_t be a stationary transformation of your consumption series and estimate the model

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_1 y_{t-2} + \beta_1 y_{t-3} + \beta_1 y_{t-4} + e_t.$$

Summarise the estimation output and provide residual diagnostics on autocorrelation, ARCH and normality. Do the diagnostics suggest that the residuals are Gaussian white noise?

Question 3. Construct a general unrestricted model (GUM) that nests the specifications a) to f), and give the restrictions on the GUM necessary to obtain a) to f). Note: Both y_t and x_t are are stationary.

a) $y_t = -0.20(y_{t-1} + y_{t-3}) + \epsilon_t$

b) $y_t = 0.30 + 0.10y_{t-2} + 0.60y_{t-4} + \epsilon_t$

c) $y_t = 0.1\sum_{j=1}^{4} y_{t-j} + \epsilon_t$

d) $y_t = 0.5 + 0.3(\Delta y_{t-1} + 2\Delta y_{t-3}) + \epsilon_t$

e) $y_t = -0.10 + 1.30(2x_t + x_{t-4}) + \epsilon_t$

f) $y_t = 0.10y_{t-1} + 0.50\Delta x_t + 0.25\Delta x_{t-4} + \epsilon_t$

Question 4. Let y_t, x_t, $s_{2,t}$, $s_{3,t}$ and $s_{4,t}$ denote stationary variables, and consider the two specifications

$$\begin{aligned} y_t &= \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-2}\beta_3 y_{t-3} + \beta_4 y_{t-4} \\ &\quad + \beta_5 x_t + \beta_6 s_{2,t} + \beta_7 s_{3,t} + \beta_8 s_{4,t} + \epsilon_{A,t}, \qquad \epsilon_{A,t} \sim IN(0, \sigma_A^2) \end{aligned} \tag{1}$$

$$\begin{aligned} y_t &= \beta_1(y_{t-1} + 2y_{t-2} + 3y_{t-3} - 6y_{t-4}) \\ &\quad + \beta_5 x_t + \beta_6[s_{2,t} + 2(s_{3,t} + s_{4,t})] + \epsilon_{B,t}, \qquad \epsilon_{B,t} \sim IN(0, \sigma_B^2) \end{aligned} \tag{2}$$

Specification (2) is nested in (1), so (2) is therefore a restricted version of (1). What are the linear restrictions on (1) needed in order to obtain (2)? Suppose ordinary least squares (OLS) estimation of (1) produces a sum of squared residuals (SSR) of 0.007428, and that OLS estimation of (2) produces an SSR of 0.014505, both estimated on the same data with a sample size of $T = 100$. Are the restrictions implied by (2) valid at 10%? At 5%? At 1%?