Additional Questions (Not Homework)

We estimate a demand function of Alcoholic beverages and tobacco, using seasonally adjusted quarterly data from the first quarter of 1994 to the first quarter of 2013. That is, the sample size is given by $T = 77$.

The notations are as follows:

$X1_t =$ Alcoholic beverages and tobacco,

$Y_t =$ National disposable income of Households (including private unincorporated enterprises),

$$P1_t = \frac{\text{Deflator of Alcoholic beverages and tobacco}}{\text{Deflator of Domestic final consumption expenditure of households}},$$

$$P2_t = \frac{\text{Deflator of Food and non-alcoholic beverages}}{\text{Deflator of Domestic final consumption expenditure of households}},$$

where the Deflators are Fixed-based (Base year = calendar year of 2005).

Use the appropriate tables, but write clearly which table is used in each question.

(1) First, using EViews 7.2, we have estimated the four regressions by OLS to see whether each time series is stationary or nonstationay.

$$\begin{aligned}
\Delta X1_t = &- \underset{(-1.14)}{0.358} + \underset{(1.08)}{0.044}\ X1_{t-1} \\
&- \underset{(-5.15)}{0.693}\ \Delta X1_{t-1} - \underset{(-2.27)}{0.349}\ \Delta X1_{t-2} - \underset{(-2.11)}{0.321}\ \Delta X1_{t-3} - \underset{(-1.29)}{0.164}\ \Delta X1_{t-4},
\end{aligned}$$

$$\begin{aligned}
\Delta Y_t = &\ \underset{(0.05)}{0.027} - \underset{(-0.04)}{0.002}\ Y_{t-1} \\
&- \underset{(-2.68)}{0.342}\ \Delta Y_{t-1} - \underset{(-1.90)}{0.244}\ \Delta Y_{t-2} - \underset{(-2.39)}{0.285}\ \Delta Y_{t-3} + \underset{(3.85)}{0.445}\ \Delta Y_{t-4},
\end{aligned}$$

$$\begin{aligned}
\Delta P1_t = &\ \underset{(2.07)}{0.005} + \underset{(0.92)}{0.018}\ P1_{t-1} \\
&+ \underset{(2.92)}{0.368}\ \Delta P1_{t-1} - \underset{(-2.53)}{0.337}\ \Delta P1_{t-2} + \underset{(1.03)}{0.136}\ \Delta P1_{t-3} - \underset{(-0.68)}{0.087}\ \Delta P1_{t-4},
\end{aligned}$$

$$\begin{aligned}
\Delta P2_t = &\ \underset{(1.08)}{0.001} - \underset{(-0.15)}{0.005}\ P2_{t-1} \\
&- \underset{(-1.12)}{0.141}\ \Delta P2_{t-1} + \underset{(0.07)}{0.009}\ \Delta P2_{t-2} + \underset{(0.58)}{0.074}\ \Delta P2_{t-3} + \underset{(1.44)}{0.177}\ \Delta P2_{t-4},
\end{aligned}$$

where the values in the parentheses denote the t-value.

Discuss the results obtained above, explaining how to test stationarity or nonstationarity.

(2) To check whether there exists the cointegration relationship among $X1_t$, Y_t, $P1_t$ and $P2_t$, we have estimated the following two regressions by OLS.

$$X1_t = -\underset{(-0.61)}{1.856} + \underset{(3.10)}{0.847}\ Y_t - \underset{(-20.2)}{1.976}\ P1_t - \underset{(-0.27)}{0.085}\ P2_t + e_t,$$

where e_t denotes the residual.

$$\begin{aligned}\Delta e_t = & \underset{(0.18)}{0.001} - \underset{(-1.95)}{0.316}\ e_{t-1} \\ & - \underset{(-3.76)}{0.656}\ \Delta e_{t-1} - \underset{(-1.33)}{0.244}\ \Delta e_{t-2} - \underset{(-0.85)}{0.147}\ \Delta e_{t-3} - \underset{(-0.81)}{0.101}\ \Delta e_{t-4}.\end{aligned}$$

Discuss the estimation results above, explaining what happens if there exists the cointegration relationship and if not.