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EA-Lab Test-2

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Q-> Cropping Intensity (Y_t) = f(Irrigation Intensity (X_1), Fertilizer use Intensity (X_2))

- Estimate the model, (with the residuals).

$$Y_t = \alpha + \beta_1 X_1 + \beta_2 X_2 + u_t$$

① Runs Test:

- Calculate the number of Runs!
- Calculate 4 confidence interval:
- The number of runs lie in the confidence interval therefore there is no problem of Autocorrelation.

- Plot ~~ut/u~~ $\hat{u}_t / \hat{u}_{t-1}$

The scatter plot also shows no clear ~~to~~ positive or negative trend indicating there is no problem of auto correlation

② Durbin Watson Test (For $\hat{u}_t$ vs $\hat{u}_{t-1}$)

- The value of the d statistic is almost 2 => No autocorrelation.

- The upper limit du for (55) observation is (1.428), this models d stat is 1.918
- No Autocorrelation, as du < dstat < 4-du at 5% sign level.

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The formula for d-stat

$$d = \frac{\sum_{t=2}^{n} (\hat{u}_t - \hat{u}_{t-1})}{\sum_{t=1}^{n} \hat{u}_t^2}.$$

1b) Structural Breaks: Chow Test.

To check if there are structural breaks in the dataset; divide the dataset into two parts: Take the break at 1991-92 economic reforms:

- Estimate Regression results for 1st sub period
- " " " " 2nd " "
- " " " " the total period.

1st Sub period: $Y_t = \alpha_1 + \beta_1 X_t + u_{1t}$
2nd Subperiod: $Y_t = \alpha_2 + \beta_2 X_t + u_{2t}$

{ Here X_t is time }

$$H_0: \alpha_1 = \alpha_2 ; \beta_1 = \beta_2$$

We imposed two restrictions $\Rightarrow \boxed{k = 2.}$

Calculate the F statistic by

$$F = \frac{(RRSS - URSS)/k}{URSS/(n_1 + n_2 - 2k)}$$

RRSS → Restricted Residual Sum of Squares
URSS → Unrestricted " " "
"

The F-Stat turns out to be 5.702 with prob 0.0059.
⇒ F-Stat is significant at 1%.

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This implies that there is a significant change in Cropping intensity after 91-92.

This conclusion will not hold until the variances are not significantly different :

Comparing Variances :-

Calculate F stat for variances as

$$F = \frac{\sigma_1}{\sigma_2} \rightarrow \frac{\text{Mean RSS}_1}{\text{Mean RSS}_2}$$ { Keep the higher value in numerator

- The F-Stat turns out to be ~~2.7~~ 2.859054 with prob 0.0049.
  $\Rightarrow H_0$ is rejected at 1% significance and $\therefore$ the variances are significantly different from each other.

- Chow Test can't be applied here

- We can't say that there has been a significant impact on cropping intensity after 91-92.

- We can test for more periods by applying the same method.

→ (Using
Running out of time...so)

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