

Cointegration: the Engle and Granger approach

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 - Testing
 - Long-run relationship approach
 - Small Monte-Carlo study with R
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What about log? Does the representation stays linear?

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Inference on the coint vector

Cointegration relationship:

$$\begin{cases} y_t &= \alpha + \beta z_t + \varepsilon_{1t} \\ \Delta z_t &= \varepsilon_{2t} \end{cases}$$

Cointegration: ε_{1t} and ε_{2t} is stationary.

But ε_{1t} and ε_{2t} can be:

- serially correlated
- correlated with each other

Usual inference (t-test) is valid only under the assumption:

- Residuals are white noise
- 1 variable is exogene

Usual restrictions on VAR model become: $\alpha'\beta = 0$ and short run coeff = 0
See Lutkepohl 262

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Say we have one cointegration relationship:

$$\beta_1 Y_{1t} + \beta_2 Y_{2t} + \dots + \beta_K Y_{Kt} = 0$$

$$\text{or } Y_{1t} = -\frac{\beta_2}{\beta_1} Y_{2t} - \dots - \frac{\beta_K}{\beta_1} Y_{Kt} = 0$$

What is the impact of Y_2 on Y_1 ?

Is it $\frac{\beta_2}{\beta_1}$ like in standard regression? No because Y_2 impacts also Y_3, \dots, Y_K !

So see impulse response function!