Cointegration: the Engle and Granger approach

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1. Lectures

2. Cointegration 1: the Engle and Granger approach
   - Definition
   - Economic interpretation
   - Vector error correction model (VECM)
   - The Engel-Granger theorem
   - Common trend representation
   - Estimation and testing
     - VECM approach
     - Long-run relationship approach
   - Testing
     - Long-run relationship approach
     - Small Monte-Carlo study with R

3. Granger causality

4. Impulse response function
   - VECM case

Outline

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What about log? Does the representation stays linear?

Outline

Inference on the coint vector

Cointegration relationshiph:

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

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

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 variable1 is exogene

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

Outline

Say we have one cointegration relationship:
$\beta_1 Y_{1t} + \beta_2 Y_{2t} + \ldots + \beta_K Y_{Kt} = 0$
or $Y_{1t} = -\frac{\beta_2}{\beta_1} Y_{2t} - \ldots - \frac{\beta_K}{\beta_K} Y_{Kt} = 0$
What is the impact of Y_2 on Y_1?
Is it $\frac{\beta_2}{\beta_1}$ like in standrad regresssion? No because Y_2 impacts also $Y_3, \ldots, Y_K$!
So see impulse response function!