Vector autoregression

Cholesky decomposition

Slide 65

decomposes a symmetric positive definite matrix A into the product of a lower triangular matrix L and its transpose:

$$A = L \cdot L^T$$

Example:

- A is symmetric: $A = A^T$
- A is positive definite:
  $x^T A x > 0$ for any non-zero vector x

$$A = \begin{bmatrix} 4 & 12 & -16 \\ 12 & 37 & -43 \\ -16 & -43 & 98 \end{bmatrix}$$

Cholesky decomposition produces:

$$L = \begin{bmatrix} 2 & 0 & 0 \\ 6 & 1 & 0 \\ -8 & 5 & 3 \end{bmatrix} \quad \text{and} \quad L^T = \begin{bmatrix} 2 & 6 & -8 \\ 0 & 1 & 5 \\ 0 & 0 & 3 \end{bmatrix}$$

Short-run SVAR model — Slide 69

For $g=3$:

- at most $3 \cdot 4/2 = 6$ parameters are estimated in matrices A and B combined;
- at least $2 \cdot 3^2 - 6 = 12$ restrictions are needed.

Long-run SVAR model — Slide 71

For $g=3$:

- at most $3 \cdot 4/2 = 6$ parameters are estimated in matrix C;
- at least $3^2 - 6 = 3$ restrictions are needed.

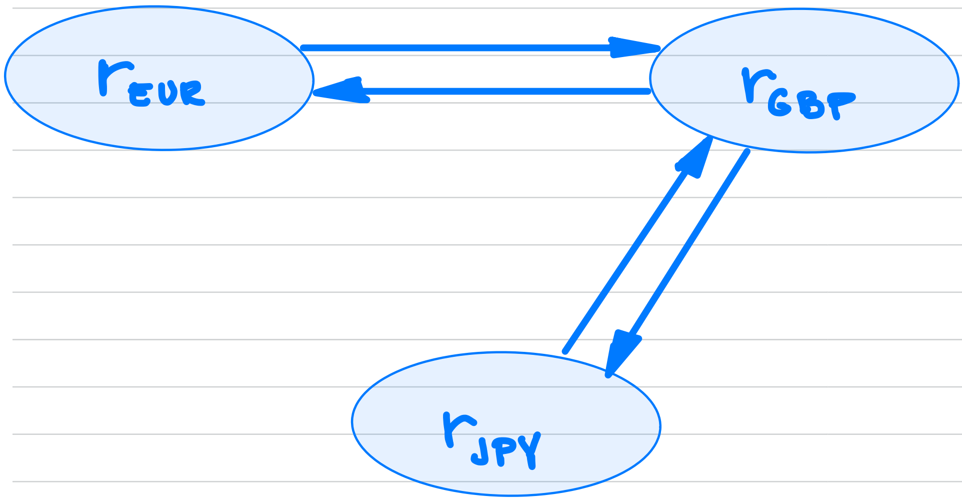
Example 2

Ad g) PDF, pp. 18–19.

Granger causality Wald test:

H_0: "excluded" variable does not Granger cause the "equation" variable
H_1: "excluded" variable Granger causes the "equation" variable

Scheme of Granger causality test results:



Consequently, the pound-dollar rate (r_{GBP}) reacts the fastest.