13_CSARDL

QuantFit Estimator Standard Operating Procedure

SOP: Cross-Sectionally Augmented ARDL (CS-ARDL)

Chudik-Pesaran heterogeneous panel ARDL with CSD correction

=> CS-ARDL augments each country's ARDL with cross-sectional means to absorb common factors.

1. Purpose

CS-ARDL adds the cross-sectional means of Y and X (and their lags) to each country's ARDL specification. This proxies for unobserved common factors driving cross-sectional dependence, restoring consistent estimation of the long-run coefficients.

2. When to use this estimator

Panel ARDL with confirmed CSD (Pesaran CD $p < 0.05$).

Slope heterogeneity present.

Large N and moderate T.

3. Required data structure

Balanced panel preferred.

Same I(0)/I(1) conditions as ARDL.

4. Mathematical formulation

Per-country UECM augmented with cross-sectional means:

DeltaY_{i,t} = alpha_i + phi_i (Y_{i,t-1} - lambda_i' X_{i,t-1}) + Sum ? DeltaX + Sum mu Z?_{t-l} + epsilon_{i,t}

Z?_{t-l} = cross-sectional means of (Y, X) at lag l

Per-country estimation; long-run = cross-country average.

5. Pre-estimation diagnostics

Pesaran CD => rejection motivates CS-ARDL.

Slope homogeneity test.

Per-country ARDL pre-checks.

6. Estimation procedure

Compute cross-sectional means of Y and X at each t.

Per-country ARDL with cross-sectional means and lags appended.

Cross-country average of lambda?_i.

Floor pT = floor(T^{1/3}) lags of cross-section means.

7. Output produced

8. Output interpretation

Long-run estimate consistent under CSD plus heterogeneity.

CS-mean coefficients absorb the influence of unobserved common factors.

9. Post-estimation diagnostics

Pesaran CD on residuals (should be eliminated).

Slope homogeneity ex-post.

10. Common pitfalls

Adding too many lags of cross-section means depletes degrees of freedom.

Strong CSD with small N can leave residual CSD.

11. Reporting checklist

Pesaran CD before and after CS augmentation.

Per-country selected lag orders.

Long-run table with cross-sectional SE.

Cross-section mean coefficient table.

12. References

Chudik, A., Pesaran, M. H. (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors.

Field | Meaning

longRunCoefficients | Average per-country lambda?

longRunSE | Cross-sectional SE

csMeanCoefficients | Cross-sectional mean coefficients (mu?)

unitResults | Per-country fit including CS columns

ect | Average per-country phi?