

Package Name: Kilian Bias-Adjusted Bootstrap
Author: Davaajargal Luvsannyam
Date: 2019.05.26
Add-in Type: VAR
Default Proc Name: kilian
Default Menu Text: Kilian Bias-Adjusted Bootstrap
Interface: Dialog and command line

Description

The Kilian Bias-Adjusted Bootstrap interval explicitly account for the bias and skewness of small sample distribution of impulse response estimator. The add-in implements the following algorithm for the bias-corrected bootstrap method.

Step 1a: Estimate the VAR(p) and generate n=1000 bootstrap replication $\widehat{\beta}^*$ from

$$y_t = v + B_1 y_{t-1} + \dots + B_p y_{t-p} + u_t$$

using standard nonparametric bootstrap techniques. Then approximate the bias term $\Psi = E(\widehat{\beta} - \beta)$ by $\Psi^* = E(\widehat{\beta}^* - \beta^*)$

Step 1b: Calculate the modulus of the largest root of the companion matrix associated with $\widehat{\beta}$. Denote this quantity by $m(\widehat{\beta})$. If $m(\widehat{\beta}) \geq 1$ then set $\widetilde{\beta} = \widehat{\beta}$ without any adjustments. If $m(\widehat{\beta}) < 1$ then construct bias-corrected coefficient estimate $\widetilde{\beta} = \widehat{\beta} - \Psi$. If $m(\widetilde{\beta}) \geq 1$, let $\widehat{\Psi}_1 = \widehat{\Psi}$, and $\delta_1 = 1$ and define $\widehat{\Psi}_{i+1} = \delta_i \widehat{\Psi}_i$ and $\delta_{i+1} = \delta_i - 0.01$. Set $\widetilde{\beta} = \widetilde{\beta}_i$ after iterating on $\widetilde{\beta}_i = \widehat{\beta} - \widehat{\Psi}_i$, $i = 1, 2, \dots$, until $m(\widetilde{\beta}_i) < 1$.

Step 2: Substitute $\widetilde{\beta}$ for $\widehat{\beta}$ and generate 1000 new bootstrap replication $\widehat{\beta}^*$.

Step 3: Calculate α and $1 - \alpha$ percentile interval endpoints of the distribution.

Dialog

Upon running the add-in from the menus, a dialog will appear:

Kilian Bias-Adjusted Bootstrap

Impulse variable
|

Bootstrap draws
1000

Number of steps
48

Identification method
☒ Cholesky(recursive)
☐ Generalized

Percent of Bootstrap Interval
0.95

☒ Bootstrapped Response graph
☐ Save

OK Cancel

Command line:

varobject.kilian(options) impulse variable

For example:

var01.kilian(ndraws=1000, nsteps=48, method=1(2), cint=0.95, graph=1(0), save=0(1)) fedfunds

References:

Kilian, L., 1998, "Small-Sample Confidence Intervals for Impulse Response Functions"
The Review of Statistics and Economics , pp. 218–230.