

Topic 5: Two-Way Cluster-Robust (TWCR) Standard Errors

by Sai Zhang

Key points: The validity of Two-Way Cluster-Robust (TWCR) standard errors

Disclaimer: *This note is compiled by Sai Zhang.*

5.1 One-Way Clustering

First, consider the case of one-way clustering. The linear model with one-way clustering

$$y_{ig} = \mathbf{x}_{ig}\boldsymbol{\beta} + u_{ig}$$

where i denotes the i th of the N individuals in the sample, j denotes the g th of the G clusters, assume that

- $\mathbb{E}[u_{ig} | \mathbf{x}_{ig}] = 0$
- error independence across clusters: for $i \neq j$

$$\mathbb{E}[u_{ig}u_{jg'} | \mathbf{x}_{ig}, \mathbf{x}_{jg'}] = 0 \quad (5.1)$$

unless $g = g'$, that is, errors for individuals within the same cluster may be correlated.

for $i \neq j$

Chiang and Sasaki (2023) (Menzel, 2021) Cameron et al. (2011)

References

- A Colin Cameron, Jonah B Gelbach, and Douglas L Miller. Robust inference with multiway clustering. *Journal of Business & Economic Statistics*, 29(2):238–249, 2011.
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- Konrad Menzel. Bootstrap with cluster-dependence in two or more dimensions. *Econometrica*, 89(5):2143–2188, 2021.