

## 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

[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.