

Assumptions

Ass 3.1: Linearity

$$y_i = z_i' \delta + \varepsilon_i$$

Ass 3.2: Ergodic Stationarity (for $w_i = \{y_i, x_i, z_i\}$)

Ass 3.3: Orthogonality

$$E(g_i) = E(x_i \varepsilon_i) = 0$$

Ass 3.4: Rank condition

$E(x_i z_i') \sum_{xz}$ is full rank, $\text{Rank}(\sum_{xz}) = L$
when $K=L$, $\sum_{xz}^{-1}$ exists.

Ass 3.5: g_i is a m.d.s with finite second moments

$$g_i \sim m. d. s$$

$E(g_i g_i')$ is nonsingular.

Ass 3.6: finite fourth moments

$E[(x_{ik} z_{il}')^2]$ exists and finite.

Ass 3.7: Conditional Homoskedasticity

2SLS

$$Z = X\pi + v$$

first stage:

$$\hat{Z} = X(X'X)^{-1}X'Z = PZ$$

second stage:

$$\hat{\delta}_{IV} = (\hat{Z}'\hat{Z})^{-1}\hat{Z}'y$$

By WLLN, CLT and some lemmas(see GMM):

$$\hat{\delta}_{IV} \xrightarrow{p} \delta$$

CAN: Consistent and Asymptotically Normal