ECON3360 - Tutorial 3

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The Underlying Idea

- Test the idea that ‘institutions matter’ for economic growth.
  - In particular, countries with more secure protection of property rights have an advantage in encouraging capital accumulation.
- A simple regression of GDP per capita on a measure of the current strength of property rights is vulnerable to omitted variables and reverse causality.
- They use an IV approach, instrumenting property rights with a measure of settler mortality from the 19th century. They argue;
  - this is a good instrument because areas where settler mortality was high introduced institutions designed to exploit resources, whereas areas with low settler mortality built sound institutions,
  - these early institutions correlate with current institutions.

Regression Equations

First Stage regression:

$$S_i = \alpha_1 + \rho_1 Z_i + \kappa_i$$

where Z_i is the IV and S_i is the endogenous variable.

Second Stage regression:

$$Y_i = \alpha_2 + \rho_2 S_i + h_i$$

Reduced Form equation:

$$Y_i = \alpha_3 + \rho_3 Z_i + \lambda_i$$

Instrumental Variable Estimator

With one endogenous variable and one instrument, the IV estimator is:

$$\widehat{\rho}_{iv} = \frac{\text{Cov}\left(Y_i, Z_i\right)}{\text{Cov}\left(S_i, Z_i\right)}$$

Validity of Instruments

$$Y_i = \alpha_2 + \rho_2 S_i + h_i$$

2 important conditions for a valid IV:

1. $\mathrm{Cov}\,(S_i, Z_i) \neq 0$: the IV is relevant, it is correlated with the endogenous regressor (1st stage exists).
2. $\mathrm{Cov}\,(Z_i, h_i) = 0$: exclusion restriction, Z is uncorrelated with any other determinants of the dependent variable.

Causal Graph

$$\begin{tikzcd}
Z_i \arrow[r, "\rho_1"] & S_i \arrow[r, "\rho_2"] & Y_i \\
& \text{Confounders (Unobservable)} \arrow[u] \arrow[ur] &
\end{tikzcd}$$