14.750x: Political Economy and Economic Development

Module 3 Problem Set

Use the AJRData.RData dataset to answer the questions below. You should restrict the sample to match the sample the authors use in the paper [baseco should equal 1].

Part 1

1. Regress the log GDP per capita in 1995 [logpgp95] on the average protection against expropriation risk [avexpr].

   Hint: Remember to restrict your sample as described in the introduction!

   R Tip: For plotting, consider the package `ggplot2`.

   (a) Interpret $\widehat{\beta}_{ols}$.

   Hint: Use the exact method for interpreting log variables, not the approximation.

   A one point increase in average protection against expropriation risk is related to an increase in GDP of _____%. Please round this number to the second decimal.

   (b) Is your interpretation causal? Why or why not?

   i. Yes. Since we are using an OLS regression, the estimate $\widehat{\beta}_{ols}$ represents a causal effect.
   ii. Yes. Since we are using instrumental variables, the estimate $\widehat{\beta}_{ols}$ represents a causal effect.
   iii. No. There may be reverse causality or omitted variable bias.
   iv. No. The relationship is not statistically significant.

   (c) Plot log GDP per capita in 1995 against avexpr. What is the slope of the graph?

   i. Positive
   ii. Negative
   iii. Zero

Part 2

2. Regress the average protection against expropriation risk [avexpr] on settler mortality [logem4]. Call this $\widehat{\pi}$.

   Hint: Remember to restrict your sample as described in the introduction!

(a) Plot avexpr against settler mortality.

Fill in the blank: Lower settler mortality is associated with _____ average protection against expropriation risk.

i. higher
ii. lower
iii. no change in

(b) What is the estimate and standard error of logem4? Use four places after the decimal.

Part 3

3. Regress the log GDP per capita in 1995 on settler mortality. Call this $\widehat{\gamma}$.

Hint: Remember to restrict your sample as described in the introduction!

(a) Plot the relationship. What is the slope of the graph?

i. Positive
ii. Negative
iii. Zero

(b) Match the following symbols with their respective terms:

i. $\hat{\pi}$
   A. first stage
   B. reduced form
ii. $\hat{\gamma}$
   A. first stage
   B. reduced form

(c) What is the Wald Estimator equal to? Enter the terms for a and b, given $\frac{\hat{a}}{\hat{b}}$.

Enter each response using the terms "gamma" and/or "pi".

(d) Compute the Wald Estimator in this example. Use three places after the decimal.

Part 4

4. Compute a 2SLS (two stage least squares) regression of log GDP per capita in 1995 on avexpr, using settler mortality as the instrumental variable.

Hint: Remember to restrict your sample as described in the introduction!

R Tip: For IV, try the `ivreg` command in the `AER` package.

(a) Interpret $\widehat{\beta}_{2sls}$. *Hint: Use the exact method for interpreting log variables, not the approximation.* A one point increase in average protection against expropriation risk leads to a _ _% increase in GDP. Round answers to the nearest tenth of a percent.

(b) Compare $\widehat{\beta}_{2sls}$ to $\widehat{\beta}_{ols}$. Are they similar or different? Why do you think this is the case?

i. They are similar, as neither $\widehat{\beta}_{2sls}$ nor $\widehat{\beta}_{ols}$ is biased.
ii. They are similar, because both $\widehat{\beta}_{2sls}$ and $\widehat{\beta}_{ols}$ are biased.

iii. They are different, as $\widehat{\beta}_{2sls}$ is likely biased
iv. They are different, as $\widehat{\beta}_{ols}$ is likely biased

(c) Fill in the terms for a and b in the formula below to create the correct mathematical relationship between $\widehat{\beta}_{2sls}$, $\widehat{\pi}$, and $\widehat{\gamma}$?

$$\widehat{\beta}_{2sls} = \frac{\hat{a}}{\hat{b}}$$

Enter each response using the terms "gamma" and/or "pi".