

New Economic School

Political Economics

Problem Set #2

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In this problem set please use your knowledge of applied and theoretical econometrics, basic algebra, and common sense. No special knowledge of political economics is required to solve it.

Problem 1. IV Estimations of the effect of institutions: Cluster of Institutions versus Specific Institutions

Following Acemoglu* suppose, that you have a structural relationship between the economical variable of interest Y_i (for example the size of government spending) and a broad “cluster of institutions” G_i (a measure of a quality of all the institutions in the country):

$$Y_i = \alpha G_i + X_i' \beta + u_i$$

The cluster of institutions G_i consists of K specific institutions S_i^k , so

$$G_i = \sum_{k=1}^K \nu^k S_i^k + \mu_i$$

and you have an instrument Z_i which is “good” for estimating the effect of G_i on Y_i , i.e.

$$S_i^k = \theta^k Z_i + v_i^k$$

$$\text{cov}(u_i, \mu_i) \neq 0; \text{cov}(u_i, S_i^k) \neq 0; \text{cov}(Z_i, u_i) = 0; \text{cov}(Z_i, \mu_i) = 0$$

$$\forall k : \text{cov}(\mu_i, v_i^k) = \text{cov}(Z_i, v_i^k) = 0; \forall k \neq j : \text{cov}(v_i^j, v_i^k) = 0$$

Also suppose that everything is independent across i and that X_i' are non-institutional variables:

$$\forall k : \text{cov}(X_i, u_i) = \text{cov}(X_i, \mu_i) = \text{cov}(X_i, v_i^k) = 0$$

The purpose of this problem is to show, that it is impossible to estimate consistently the casual effect of specific institution on economic performance with IV even if instruments are “good” for estimating the casual effect of a broad “cluster of institutions”. The intuition is that all economic, political, social and law institutions reinforce each other and are correlated.

Suppose you want to measure the influence of some specific institution S_i^1 on outcome of interest Y_i . To do this you are suggested to estimate following equation by IV with instruments (Z_i, X_i) :

$$Y_i = \alpha^1 S_i^1 + X_i' \beta^1 + u_i^1 \quad (1)$$

a. What is the true value of α^1 (write it down using the parameters of the original model)? Express error u_i^1 in terms of errors, variables and parameters of the original model? What would you expect from estimating the equation (1) by suggested method?

b. Write down the moment conditions for IV estimation of equation (1).

c. Solve the moment conditions for α^1 . (Note that these moment conditions should be exact-identifying, so you can use CMM).

d. Show that IV estimator for α^1 is inconsistent and biased. Find an asymptotic bias of this estimator. What is your intuition of this result? Make suggestions on how to handle with this problem?

Problem 2. Estimating Average Treatment Effects and Difference-in-Difference in Panel Data: Example – Term Limits

Suppose you are interested in estimating the effect of binding term limits (i.e., the fact that a politician can not run for office more than X times) on policies. You have a panel dataset for S states and T years. This dataset consist of the following variables:

* Acemoglu, D., “Constitutions, Politics and Economics: A Review Essay on Persson and Tabellini’s *The Economic Effects of Constitutions*”, mimeo MIT, 2005

P_{st} - policy (continuous variable) in state s and year t

T_{st} - binding term limit (dummy, equals 1 if policymaker is in his last term in this period, i.e., can not run for office in the next elections)

D_{st} - “democrat” (dummy, equals 1 if policymaker belongs to the first of the two political parties - democratic and republican)

X_{st} - covariates (time and state measures of income & demographics that have independent effect on policy)

a. How would you go about estimating the effect of binding term limits on policy (write down a specification of a model)? Which parameters estimate this effect?

b. Explain what is the interpretation of each estimation parameter (denoted by a Greek letter) in the following specification (note that henceforth φ_s and θ_t denote fixed estimation parameters):

$P_{st} = \varphi_s + \theta_t + \alpha T_{st} + \beta T_{st} D_{st} + \delta D_{st} + X_{st}' \eta + \varepsilon_{st}$. Henceforth, in this problem, we assume that all standard assumptions about error terms in all equations are satisfied. (I.e., $E[\varepsilon_{st} | T_{st}, D_{st}, X_{st}] = 0$ and $\varepsilon_{st} \sim iid$).

c. Now let N_{st} be exogenous observable shock to the demand of voters for P_{st} .

Explain what is the interpretation of each estimation parameter (denoted by a Greek letter) in the following specification:

$$P_{st} = \tilde{\varphi}_s + \tilde{\theta}_t + \tilde{\alpha} T_{st} + \tilde{\beta} T_{st} N_{st} + \tilde{\gamma} N_{st} + \tilde{\delta} D_{st} + X_{st}' \tilde{\eta} + \tilde{\varepsilon}_{st}$$

d. Now let us denote demeaned N_{st} by N_{st}^D , formally: $N_{st}^D = N_{st} - \bar{N}$; where $\bar{N} = \frac{1}{S \cdot T} \sum_s \sum_t N_{st}$.

Explain what is an interpretation of each estimation parameter (denoted by a Greek letter) in the following specification:

$$P_{st} = \check{\varphi}_s + \check{\theta}_t + \check{\alpha} T_{st} + \check{\beta} T_{st} N_{st}^D + \check{\gamma} N_{st} + \check{\delta} D_{st} + X_{st}' \check{\eta} + \check{\varepsilon}_{st}$$

e. Explain what is an interpretation of each estimation parameter (denoted by a Greek letter) in the following specification:

$$P_{st} = \hat{\varphi}_s + \hat{\theta}_t + \hat{\alpha} T_{st} N_{st} + \hat{\beta} (1 - T_{st}) N_{st} + \hat{\gamma} T_{st} + \hat{\delta} D_{st} + X_{st}' \hat{\eta} + \hat{\varepsilon}_{st}$$

f. Show formally how parameters from (c), (d) and (e) are related.

g. Write down the specification that test if democratic governors who DO NOT face binding term limits have systematically different response to exogenous shifts in demand for P_{st} (i.e. to N_{st}) compared to republican governors who also DO NOT face term limits (you should write down the model and formulate Ho and Ha, and briefly describe the test).

h. Write down the specification that test if democratic governors who DO face binding term limit have systematically different response to exogenous shifts in demand for P_{st} (i.e. to N_{st}) compared to republican governors who DO NOT face term limit (you should write down the model and formulate Ho and Ha, and briefly describe the test).

Problem 3. Pitfalls of Empirical Work

Consider the following regressions. In each case, explain the reasoning behind doing this and also criticize it. Be brief but informative; in particular, give suggestions of how you would improve on the empirical strategy.

a. A researcher wants to find out whether greater ethnic fragmentation leads to worse political decisions. For this reason, she runs a regression of the fraction of local government revenues in U.S. cities spent for education on an index of ethnic diversity in the city.

b. A researcher wants to find out whether common (British) law leads to better political outcomes. For this reason, he runs a regression of an index of corruption on a dummy for having common law rather than French civil law or German legal code.

c. Another researcher wants to answer the same question, and he runs regression of an index for corruption on a dummy for having common law, and instruments this using a dummy for having been a British colony.

d. A researcher wants to investigate the impact of democracy on inequality, so he runs a regression of income inequality measured with Gini coefficient on various measures of democracy.