Tutorial 3
Instrumental Variables - Due on 10.05.2022 20:00

Empirical Banking and Finance
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Formal Requirements

- NEW: Please upload one file per group on eCampus
- Two students per group
- Indicate both student IDs on your solution
- Do not write your name on your solution
- Format .pdf or .doc file, no log or txt files please
- Only one file, add your .do file at the end of your solution
- No late submissions will be accepted

Exercise

This exercise[1] follows [Levine et al., 2000] using an instrumental variable based on [Porta et al., 1998] to study the relationship between finance and growth. We use the original data as in the previous tutorial. The data can be found on Rafael La Porta's Webpage.

1. Motivating the use of Instrumental Variables (IV)
   a) In a cross-country regression with average *gdpgrowth* from 1960-1995 on the LHS and *private_credit_1960* on the RHS mention two distinct economic mechanisms why the estimated coefficient might *not* represent the causal effect of "finance" on subsequent gdp growth.
   b) Take one of the two mechanisms from a) and use the omitted variable bias formula to determine the direction of the bias introduced. Explain your reasoning.
   c) How could an instrumental variable approach solve the issue of causality?
2. Regression 1: OLS
   a) Run a regression of *gdpgrowth* on *private_credit_1960*

[1] Thanks to Ulrich Schüwer

b) Very briefly comment on the coefficient of *private_credit_1960* and provide a 95% confidence interval for the coefficient.

3. The Instruments
We now use the national legal origin ([Porta et al., 1998]) of a country as an instrument for its financial development

   a) Discuss whether a country's legal origin might or not satisfy the exclusion restriction? Provide two arguments/mechanisms in favor, and two arguing against the assumption.
   b) Compute average *private_credit_1960* for each group of legal origin. There are several ways to do this. The variable *legor* might be useful. Comment your results.
   c) Can we learn anything from the answer to the previous question b) about whether legal origin is a good or a bad instrument?

4. Regression 2: IV with one instrument

   a) Use French legal origin *legor_fr* as an instrument for *private_credit_1960*. Compute an IV estimate of the impact of *private_credit_1960* on *gdpgrowth* using the Wald estimator. Explain what your are doing at each step of the calculation.
   b) Run a Two-Stage-Least-Squares (2SLS) version of Regression 1 using French legal origin *legor_fr* as an instrument for *private_credit_1960*.
   c) Compare the Wald estimate to the 2SLS estimate.
   d) Compare the coefficient on *private_credit_1960* to the one in the OLS regression. How does the difference between IV and OLS coefficient compare to your answer in question 1 b)?
   e) Provide a 95% confidence interval for the coefficient.
   f) Is the model underidentified, exactly identified or overidentified?
   g) Test whether *legor_fr* is a valid instrument. Provide H_0, H_A, the test statistic, its distribution and the result of the test.

5. Regression 2: IV with several instruments

   a) Run an 2SLS version of Regression 1 using four out of five legal origin dummies as instruments for *private_credit_1960*
   b) Why cannot all legal origin dummies be included?
   c) Compare the coefficient on *private_credit_1960* to the one in question 4 b). Provid a brief comment.
   d) Provide a 95% confidence interval for the coefficient.
   e) Is the model underidentified, exactly identified or overidentified?
   f) Formally test whether the instruments are valid. Provide H_0, H_A, the test statistic, its distribution and the result of the test.
   g) Is the formal test for the exogeneity of instruments useful in this setting?

h) Test whether *private_credit_1960* is endogenous. Provide H_0, H_A, the test statistic, its distribution and the result of the test. Why does this matter from an econometric point of view? In your answer, refer to results in previous question(s).

6. Regression 3: IV with several instruments and several endogenous variables

   a) Run an IV version of Regression 1 using four out of five legal origin dummies as instruments for *private_credit_1960*, but now, add *public_banks_1970* as an additional endogenous dependent variable.

References

[Levine et al., 2000] Levine, R., Loayza, N., and Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46(1):31–77.

[Porta et al., 1998] Porta, R. L., de Silanes, F. L., Shleifer, A., and Vishny, R. W. (1998). Law and Finance. *Journal of Political Economy*, 106(6):1113–1155.