

Testing for Weak Instruments in Linear IV Regression with Two or More Endogenous Regressors

James H. Stock, Harvard University
Motohiro Yogo, Harvard University

Abstract

The quality of the standard \sqrt{n} asymptotic approximations to the distributions of instrumental variables estimators depends on the extent to which the instruments are relevant. If the instruments are weak, so that the system is nearly unidentified for a given sample size, then the sampling distribution can be quite different from its Gaussian limit. This raises a practical problem: under what circumstances can an applied researcher be confident that identification is “good enough,” that is, that the instruments are not weak? This problem has been addressed previously when there is a single endogenous regressor. This paper considers the problem of two or more included endogenous regressors. The paper has two specific contributions. First, we characterize the set of weak instruments in terms of specific population measures on quality of IV estimators, which in turn depend on eigenvalues of the concentration matrix. Second, we provide a statistical procedure to test for whether the instruments at hand are in that set, where the probability of a false negative (concluding that instruments are not weak, when in fact they are) is controlled asymptotically.