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Estimating Production Functions with Control Functions When Capital Is Measured with Error

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Abstract

We revisit the production function estimators of Olley and Pakes (1996) and Levinsohn and Petrin (2003). They use control functions to address the simultaneous determination of inputs and productivity. Both assume that input demand is a monotonic function of productivity holding capital constant and then invert this function to condition on productivity during estimation. If the observed capital variable is measured with error, input demand will not generally be monotonic in the productivity shock holding observed capital constant. We develop consistent estimators of production function parameters in the face of this measurement error. Our identification and estimation results combine the nonlinear measurement error literature with Wooldridge (2009)'s joint estimation method to construct a proxy for productivity that addresses simultaneity. Our approach directly extends to the case where other inputs like intermediates or labor are observed with error.

Keywords: Production Function, Unobserved Productivity, Measurement Error, Nonparametric Estimation, Control Variate

JEL Classification: C14, C18, D24

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