The Journal of Open Source Software

Production Function Estimation in R: The prodest Package

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DOI: 10.21105/joss.00371

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Summary

The Total Factor Productivity (TFP) - also called Multi-factor productivity - measures the change in output that cannot be accounted for by changes in the amounts of input. The R package prodest provides functions for TFP estimation following the most widely-known methodologies using the control function approach. Focusing on Value Added production functions, it estimates the two–steps models presented by Olley–Pakes (1996) (Olley and Pakes 1996) and Levinshon–Petrin (2003) (Levinsohn and Petrin 2003), as well as their correction proposed by Ackerberg–Caves–Frazer (2015) (Ackerberg, Caves, and Frazer 2015). The system GMM framework proposed by Wooldridge (2009) (Wooldridge 2009) is also implemented in two slightly different versions. Dealing with standard Cobb-Douglas technology in a panel framework, all methods assume that the productivity term evolves according to a first-order Markov process and that a proxy variable exists - i.e., a function of state variables and productivity - invertible and monotonically increasing in productivity. Exploiting these features and with different choices of the proxy variables, the methods yield consistent estimates of labor and capital inputs parameters, allowing for an immediate computation of TFP. The prodest package features also the Data Generating Process used by Ackerberg–Caves–Frazer (2015) (Ackerberg, Caves, and Frazer 2015) and allows for the simulation of datasets according to several measurement errors and random shock variances. It can be used by practitioners for both running Monte Carlo simulations and benchmarking estimate results.

References

Ackerberg, D., K. Caves, and G. Frazer. 2015. "Identification Properties of Recent Production Function Estimators." *Econometrica* 83 (6): 2411–51. doi:10.3982/ECTA13408.

Levinsohn, J., and A. Petrin. 2003. "Estimating Production Functions Using Inputs to Control for Unobservables." *The Review of Economic Studies* 70 (2): 317–41. doi:10.1111/1467-937X.00246.

Olley, S. G., and A. Pakes. 1996. "The Dynamics of Productivity in the Telecommunications Equipment Industry." *Econometrica* 64 (6): 1263–97. doi:10.2307/2171831.

Wooldridge, J. M. 2009. "On Estimating Firm-Level Production Functions Using Proxy Variables to Control for Unobservables." *Economics Letters* 104: 112–14. doi:10.1016/j.econlet.2009.04.026.