

Department of Decision Sciences

Statistics Seminar

Nonparametric estimation of returns to scale

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Abstract

Estimating the returns to scale is a classic problem of economics. In this paper, we show how to efficiently estimate the returns to scale without making unnecessary parametric or exogeneity assumptions. Specifically, the production function and its degree of homogeneity are both assumed to be unknown and we show how to estimate the latter, which can now be interpreted as the returns to scale, as efficiently as possible when the factor inputs are endogenous. This is a nonstandard problem because the statistical model of the production function is "ill-posed" in this setting. Hence, care has to be taken while deriving the efficiency bound and constructing an efficient estimator for the returns to scale. We motivate our estimator as an extension of the widely used "partialling out" approach of Robinson (1988). We are thus able to show that Robinson's basic idea can be made to work even when the unknown function in a partially linear model takes on endogenous arguments.