Data envelopment analysis and parametric frontier estimation: complementary tools

Peter Kooreman

Wageningen University, P.O. Box 8060, 6700 DA Wageningen, The Netherlands

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In response to the comments by Dor, Skinner, and Newhouse, I will briefly touch upon two issues. The first one is the relationship between Data Envelopment Analysis (DEA) and Stochastic Frontier Estimation (SFE). Rather than claiming that one approach is superior to the other, it should be emphasized that DEA and SFE address different questions and serve different purposes. The difference is partly reflected by the types of information used by the two methods. DEA uses information on input and output quantities, and as such it can only address the issue of technical efficiency. SFE uses information on input prices, output quantities and total costs, and the inefficiency measured by SFE may be a combination of technical and allocative efficiency (cf. Zuckerman et al. (1994), footnote 2). Without further assumptions, the SFE method is unable to separate the two sources of inefficiency. The distinction between allocative and technical efficiency is important because in general they require different policy responses.

The DEA and SFE applications in this volume both have strong points and weaknesses. DEA is nonparametric but deterministic. SFE is stochastic but requires stringent parametric functional form and distributional assumptions. SFE uses information on prices and costs, in addition to quantities, which may introduce additional measurement errors. At the present state of the art of the two approaches should primarily be viewed as complements rather than substitutes. Future research, preferably based on panel data, should try to combine the strengths of both.

The second issue is the concern about inappropriate use of DEA and SFE frontier estimation results to reimbursement policy issues. The discussants rightly warn against too simple a translation of estimation results into budgetary adjustments, such as reducing a firm's budget by the amount of measured inefficiency. However, the fact that some people may be just too eager to directly use the

results for reimbursement policy issues does not impair the usefulness of DEA and SFE as descriptive and analytical tools. A low score is primarily an indication of the presence of special circumstances. Whether this is tantamount to ''true'' inefficiency is a question that has to be addressed next, not necessarily by means of the same data and statistical methods. Thus, in my view DEA and SFE primarily serve as signal devices. If a state of inefficiency has been determined, the appropriate actions will generally depend on the form of control and legal circumstances. For example, it is conceivable that the appropriate action is to replace a nursing home's management rather than cutting down on the budget. Cutting down (repeatedly) on a nursing home's or hospital's budget may result in a situation which is in conflict with government standards for the minimum capacity and quality of health care in a particular region.

References

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