Estimation of Theoretically Consistent Stochastic Frontier Functions in R

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Conventional econometric analysis in the field of production economics generally assumes that all producers always manage to optimize their production process. Least squares-based regression techniques attribute all departures from the optimum exclusively to random statistical noise (Kumbhakar and Lovell, 2000). However, producers do not always succeed in optimizing their production. Therefore, the framework of "Stochastic Frontier Analysis" (SFA) has been developed that explicitly allows for failures in producers' efforts to optimize their production (Kumbhakar and Lovell, 2000).

Stochastic frontier analysis is generally based on production, cost, distance, or profit functions. Microeconomic theory implies several properties of these functions. Sauer *et al.* (2006) show that consistency with microeconomic theory is important especially for estimating efficiency with frontier functions. Although theoretical consistency is required for a reasonable interpretation of the results, these conditions are not imposed in most empirical estimations of stochastic frontier models — probably because the proposed procedures to impose these conditions are rather complex and laborious. Recently, a much simpler three-step procedure that is based on the two-step method published by Koebel *et al.* (2003) has been proposed by Henningsen and Henning (2008). We show how theoretical consistent stochastic frontier functions can be estimated in R using this new procedure. This is illustrated by estimating a stochastic frontier production function with monotonicity imposed at all data points.

References

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