

# Bounded time-varying technical efficiencies

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## Abstract:

This paper is concerned with measuring the dynamic patterns of efficiency levels (deviation from a frontier), which are in the interval of  $(0,1]$  each time period. A stochastic frontier model with time-varying efficiency levels is particularly useful to investigate the dynamic links between technical efficiency levels and technical innovations. In this paper, we propose a stochastic frontier model where efficiency levels are time-varying and subject to the bounds. We use Bayesian tools to make inferences about the individual firm-specific efficiencies. Further, we consider time-variation in slope coefficients of production function. We show that the model specification is flexible enough to accommodate a number of commonly used production functions (e.g., Cobb-Douglas, translog). A specification test is also provided. We also allow for heteroskedastic effects in the temporal behaviours of inefficiencies and the error component of the stochastic frontier. The proposed model is applied to studies of China province-level farm data and economic growth of 21 OECD countries.

Key words: Stochastic frontier model, state space model, truncated time-varying, precision-based algorithm.