Measuring Productivity by Malmquist Indices in the Presence of Negative Data: an application to bank branches

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Abstract

The computation of productivity change in multi-input multi-output contexts is usually performed through Malmquist indices. Though many such uses of Malmquist indices have been reported, to the authors’ knowledge there is none where some data are negative. However, in real situations, like the bank branch application that we report in this paper, data can be negative (e.g. financial losses or reductions in client numbers over time). Therefore it is of interest that tools for efficiency measurement and productivity change analysis are developed to deal with such data. This paper is a contribution in this direction. It develops and applies a method for measuring productivity under negative data. This is done through computing DEA efficiencies and using them within a Malmquist-type index approach. The Malmquist index approach used in this paper is similar to that developed by Portela and Thanassoulis (2008) for non-negative data, where a circular index of productivity change is computed by recourse to a meta-frontier. This index is adapted in this paper to the situation where efficiency scores are computed through the RDM model (Portela et al., 2004), a model that provides radial-equivalent measures of efficiency when some data are negative. The approach is applied to a sample of bank branches to assess their operational efficiency and changes in their productivity. Comparisons of productivity between branches are also carried out and discussed.

References


Maria Conceição A. Silva Portela, Emmanuel Thanassoulis (2008) A Circular Malmquist-Type Index for Measuring Productivity – under review