The directional hybrid measure of efficiency in data envelopment analysis

ABSTRACT

The efficiency measurement is a subject of great interest. The majority of studies on DEA models have been carried out using radial or non-radial approaches regarding the application of DEA for the efficiency measurement. This paper, based on the directional distance function, proposes a new generalized hybrid measure of efficiency under generalized returns to scale with the existence of both radial and non-radial inputs and outputs. It extends the hybrid measure of efficiency from Tone (2004) to a more general case. The proposed model is not only flexible enough for the decision-maker to adjust the radial and non-radial inputs and outputs to attain the efficiency score but also avoids the computational and interpretive difficulties, thereby giving rise to an important clarification and understanding of the generalized DEA model. Furthermore, several frequently-used DEA models (such as the CCR, BCC, ERM and SBM models) which depend on the radial or non-radial approaches are derived while their results were compared to the ones obtained from this hybrid model. The empirical examples emphasize the consequence of the proposed measure.

Keyword: Data envelopment analysis; Directional distance function; Hybrid model; Efficiency score