

Finding Data Envelopment Analysis Targets Using Multi-Objective Programming in DEA-R with Stochastic Data

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Abstract : In this paper, we obtain the projection of inefficient units in data envelopment analysis (DEA) in the case of stochastic inputs and outputs using the multi-objective programming (MOP) structure. In some problems, the inputs might be stochastic while the outputs are deterministic, and vice versa. In such cases, we propose a multi-objective DEA-R model because in some cases (e.g., when unnecessary and irrational weights by the BCC model reduce the efficiency score), an efficient decision-making unit (DMU) is introduced as inefficient by the BCC model, whereas the DMU is considered efficient by the DEA-R model. In some other cases, only the ratio of stochastic data may be available (e.g., the ratio of stochastic inputs to stochastic outputs). Thus, we provide a multi-objective DEA model without explicit outputs and prove that the input-oriented MOP DEA-R model in the invariable return to scale case can be replaced by the MOP-DEA model without explicit outputs in the variable return to scale and vice versa. Using the interactive methods for solving the proposed model yields a projection corresponding to the viewpoint of the DM and the analyst, which is nearer to reality and more practical. Finally, an application is provided.

Keywords : DEA-R, multi-objective programming, stochastic data, data envelopment analysis

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