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A generalized model for data envelopment analysis. (English) Zbl 1106.90350

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Summary: Data envelopment analysis (DEA) is a method to estimate a relative efficiency of decision making units (DMUs) performing similar tasks in a production system that consumes multiple inputs to produce multiple outputs. So far, a number of DEA models have been developed: The CCR model, the BCC model and the FDH model are well known as basic DEA models. These models based on the domination structure in primal form are characterized by how to determine the production possibility set from a viewpoint of dual form; the convex cone, the convex hull and the free disposable hull for the observed data, respectively.

In this study, we suggest a model called generalized DEA (GDEA) model, which can treat the above stated basic DEA models in a unified way. In addition, by establishing the theoretical properties on relationships among the GDEA model and those DEA models, we prove that the GDEA model makes it possible to calculate the efficiency of DMU incorporating various preference structures of decision makers. Furthermore, we propose a dual approach to GDEA, GDEAD and also show that GDEAD can reveal domination relations among all DMUs.

MSC:

90B50 Management decision making, including multiple objectives

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Data envelopment analysis; Generalized DEA; Efficient frontier

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