



Efficiency measure by interval data envelopment analysis model and its application

Mozhgan Mansouri Kaleibar, Marziyeh Samsami*

University of Semnan

Ali Ashrafi

Semnan University

Abstract

Data envelopment analysis (DEA) is a non-parametric technique to measure the efficiencies of a set of decision making units (DMUs) with common crisp inputs and outputs. In real-world problems, however, inputs and outputs are interval. To analyze a DMU with interval input/output data, this paper proposed an associated evaluating approach. Nonetheless, numerous deficiencies must be improved in mentioned models.

Keywords: Data envelopment analysis, Efficiency, Interval data.

Mathematics Subject Classification [2010]: 90B50

1 Introduction

DEA is a non-parametric method for evaluating the efficiency of DMUs like bank branches, schools, transport sectors etc. on the basis of multiple inputs and outputs. Charnes, Cooper and Rhodes (CCR) [1] developed the DEA approach in 1978. After the paper of CCR, there was an exponential growth in number of publications on DEA. In more general cases, the data for evaluation are often collected from investigations employing a polling approach, where in natural language, such as good, medium, and bad, are used to represent a type of general situation of the examined entities rather than a specific case. Thus, several studies proposed the interval DEA model for input and output data [2, 3]. In this paper, DEA model is extended to be an interval model for evaluating efficiency and ranking of DMUs with interval data. At last a numerical presentation of real data from a commercial bank of Iran is considered.

2 DEA model with interval data

This paper is proposing a model which is the extension of CCR model to an interval framework. Let a set of n DMUs has m interval inputs $[X_{ij}^L, X_{ij}^U]$ and s interval outputs $[Y_{ij}^L, Y_{ij}^U]$ i.e., inputs and outputs are approximately known and not precisely measured. Thus, interval CCR model is given by interval linear programming problem (LPP) as

*Speaker