Using scatter plots to identify efficient units: a heuristic approach to data envelopment analysis

Ching-Hsiang Lai[*]

Fuh-Hwa Franklin Liu[†]

Department of Industrial Engineering and Management

National Chiao Tung University

1001 Ta Shueh Road

Hsin Chu 300

Taiwan

R.O.C.

Abstract

Data envelopment analysis (DEA), based on mathematical programming techniques, is a popular method for assessing the relative efficiency of various decision-making units (DMUs). Efficient DEA computations need to circumvent intensive time-consuming calculations. This paper indicates that the "corner points" in single input and single output scatter plot has extreme efficiency with regard to the multiple input and multiple output DEA models. This finding allows us to use two-way scatter plots to identify a subset of efficient DMUs prior to the DEA computations. These efficiency units provide a good heuristic solution to DEA without solving DEA mathematical programs. A simulated data set consisting of twenty R&D projects is presented to illustrate this technique's effectiveness and efficiency.

1. Introduction

As first developed by Charnes et al. [5] and extended by Banker et al. [4], data envelopment analysis (DEA) is a methodology used for

[*]*E-mail*: `liay@csmu.edu.tw`

[†]*E-mail*: `fliu@mail.nctu.edu.tw`