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Ranking Efficient DMUs with Stochastic Data by Considering Inefficient Frontier

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Abstract

Data Envelopment Analysis (DEA) models which evaluate the efficiency of a set of decision making units (DMUs) are unable to discriminate between efficient DMUs. The problem of discriminating between these efficient DMUs is an interesting subject. A large number of methods for fully ranking both efficient and inefficient DMUs have been proposed. Through real world applications, analysis may encounter data that are not deterministic or on have a stochastic essence but whose distribution can be defined by collecting data in successive periods and by statistical methods. In this paper, a method for ranking stochastic efficient DMUs is suggested which is based on the full inefficient frontier method. Using a numerical example, we will demonstrate how to use the result.

Keywords: Data envelopment analysis, Quadratic programming; Ranking, Standard normal distribution.

1 Introduction

Data Envelopment Analysis (DEA) was originated by Charnes et al. [2] and then it extended to an approach for evaluating the relative efficiency of DMUs. In real application, we know that usually plural DMUs are efficient. The problem of discriminating between these efficient DMUs is an interesting subject [5]. Sexton et al. [7] were pioneers in the ranking field. They introduced a ranking method based on cross-efficiency. Then, the ranking of DEA-efficient DMUs based on benchmarking, was an approach initially developed by Torgersen et al. [10]. In this method, a DMU is highly ranked if it is chosen as a reference by many other inefficient DMUs. The most popular research stream in ranking DMUs is called super-efficiency. This stream was first developed by Andersen

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