The overall efficiency of decision making units with undesirable outputs *

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Abstract

In real applications, desirable and undesirable outputs are usually produced in a production process. Furthermore, the majority of data envelopment analysis (DEA) models evaluate the efficiency of decision making units (DMUs) from optimistic point of view. In the current paper, DEA models are introduced for evaluating the performance of DMUs with undesirable outputs from two viewpoints, optimistic and pessimistic viewpoints. Afterwards, the overall efficiency of each DMU is calculated by using the geometric average of two efficiencies.

Keywords: Data envelopment analysis, Efficiency, Undesirable outputs, Geometric average

Mathematics Subject Classification [2010]:   90B50, 90C05

1   Introduction

The conventional data envelopment analysis (DEA) models usually evaluate the efficiency of decision making units (DMUs) from optimistic point of view in which inputs are minimized and outputs are maximized. Nevertheless, there are studies with calculating the performance from two aspects, optimistic and pessimistic [1]-[8]. Moreover, in many situations desirable and undesirable outputs are produced simultaneously. In DEA literature, numerous papers exist with considering undesirable outputs. Some studies consider undesirable outputs with strong disposability while others take weak disposability. For instance, readers can refer to [2]-[4]-[5]-[6]-[7]-[9]. Wang et al. [8] calculated the overall performance via calculating the geometric average of two efficiencies, optimistic and pessimistic efficiencies. In the current paper, optimistic and pessimistic efficiencies of DMUs are evaluated in the presence of undesirable outputs with different disposability assumptions. Then, the overall efficiency of each DMU is evaluated by using the geometric average of efficiencies. Actually, Wang's models [8] are extended for obtaining the overall efficiency when undesirable outputs with different disposability, strong or weak disposability, exist.

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