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Marginal Rates of Substitution in Data Envelopment Analysis with Undesirable Outputs: A Directional Approach

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Abstract

Data Envelopment Analysis (DEA) has gained a wide range of applications in measuring the relative performance of a set of comparable operational units with multiple in-commensurate inputs and outputs. One research issue which has received widespread attention in the rapidly growing field of DEA deals with the problem of determining marginal rates or elasticities of substitution of the production units. This paper uses a DEA- based procedure to calculate group marginal rates of substitution. To this end, the envelopment form of BCC model is directly applied to analyze the trade-offs and marginal rates of substitution. The contribution of this paper is the calculation of the directional marginal rates of a group of variables to another group. In order to illustrate the applicability of the proposed approach a real application on US power plants is presented.

Keywords: Data envelopment analysis, marginal rates of substitution, efficiency, undesirable outputs, trade-off

1. Introduction

Data envelopment analysis (DEA) has been proven to be a "data oriented" tool for evaluating the relative performance of a set of homogeneous decision making units (DMUs) when there are multiple incommensurate inputs and outputs. Several extensions and applications have been

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