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Data Envelopment

Analysis-Joe Zhu 2015-03-18

This handbook represents a milestone in the progression of Data Envelopment Analysis (DEA). Written by experts who are often major contributors to DEA theory, it includes a collection of chapters that

represent the current state-of-the-art in DEA research. Topics include distance functions and their value duals, cross-efficiency measures in DEA, integer DEA, weight restrictions and production trade-offs, facet analysis in DEA, scale elasticity, benchmarking and context-dependent DEA, fuzzy DEA, non-homogenous units,

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partial input-output relations, super efficiency, treatment of undesirable measures, translation invariance, stochastic nonparametric envelopment of data, and global frontier index.

Focusing only on new models/approaches of DEA, the book includes contributions from Juan Aparicio, Mette Asmild, Yao Chen, Wade D. Cook, Juan Du, Rolf Färe, Julie Harrison, Raha Imanirad, Andrew Johnson, Chiang Kao, Abolfazl Keshvari, Timo Kuosmanen, Sungmook Lim, Wenbin Liu, Dimitri Margaritis, Reza Kazemi Matin, Ole B. Olesen, Jesus T. Pastor, Niels Chr. Petersen, Victor V. Podinovski, Paul Rouse, Antti Saastamoinen, Biresh K. Sahoo, Kaoru Tone, and Zhongbao Zhou.

Research Methodology on Data Envelopment Analysis (DEA)

Jibendu Kumar Mantri
2008 Data Envelopment Analysis (DEA) represents a milestone in the progression of a continuously advancing methodology for data analysis, which finds

extensive use in industry, society and even in education. This book is a handy encyclopedia for researchers, students and practitioners looking for the latest and most comprehensive references in DEA. J.K. Mantri has specifically selected 22 research papers where DEA is applied in different fields so that the techniques discussed in this book can be used for various applications. In A Bibliography of Data Envelopment Analysis (1978-2001), Gabriel Tavares states that DEA is a mathematical programme for measuring performance efficiency of organizations popularly named as decision-making units (DMU). The DMU can be of any kind such as manufacturing units, a number of schools, banks, hospitals, police stations, firms, etc. DEA measures the performance efficiency of these kinds of DMUs, which share a common characteristic: they have a non-profit organization where measurement is difficult. DEA assumes the performance of the DMU using the concepts of efficiency and productivity, which are measured as the

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ratio of total outputs to total inputs. The efficiencies estimated are relative to the best performing DMU, which is given a score of 100%. The performance of other DMUs varies between 0% and 100%.

Data Envelopment

Analysis: Theory, Methodology, and

Applications-Abraham

Charnes 2013-12-01 This book represents a milestone in the progression of Data Envelopment Analysis (DEA). It is the first reference text which includes a comprehensive review and comparative discussion of the basic DEA models. The development is anchored in a unified mathematical and graphical treatment and includes the most important modeling extensions. In addition, this is the first book that addresses the actual process of conducting DEA analyses including combining DEA and 1 parametric techniques. The book has three other distinctive features. It traces the applications driven evolution and diffusion of DEA models and extensions across

disciplinary boundaries. It includes a comprehensive bibliography to serve as a source of references as well as a platform for further developments. And, finally, the power of DEA analysis is demonstrated through fifteen novel applications which should serve as an inspiration for future applications and extensions of the methodology. The origin of this book was a Conference on New Uses of DEA in 2 Management and Public Policy which was held at the IC Institute of the University of Texas at Austin on September 27-29, 1989. The conference was made possible through NSF Grant #SES-8722504 (A. Charnes and 2 W. W. Cooper, co-PIs) and the support of the IC Institute.

Data Envelopment

Analysis-Subhash C. Ray

2004-06-07 Using the neo-classical theory of production economics as the analytical framework, this book, first published in 2004, provides a unified and easily comprehensible, yet fairly rigorous, exposition of the

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core literature on data envelopment analysis (DEA) for readers based in different disciplines. The various DEA models are developed as nonparametric alternatives to the econometric models. Apart from the standard fare consisting of the basic input- and output-oriented DEA models formulated by Charnes, Cooper, and Rhodes, and Banker, Charnes, and Cooper, the book covers developments such as the directional distance function, free disposal hull (FDH) analysis, non-radial measures of efficiency, multiplier bounds, mergers and break-up of firms, and measurement of productivity change through the Malmquist total factor productivity index. The chapter on efficiency measurement using market prices provides the critical link between DEA and the neo-classical theory of a competitive firm. The book also covers several forms of stochastic DEA in detail.

Introduction to Data Envelopment Analysis and Its Uses-William W. Cooper

2005-11-16 Introduction to Data Envelopment Analysis and Its Uses: With DEA-Solver Software and References has been carefully designed by the authors to provide a systematic introduction to DEA and its uses as a multifaceted tool for evaluating problems in a variety of contexts. The authors have been involved in DEA's development from the beginning. William Cooper (with Abraham Charnes and Edwardo Rhodes) is a founder of DEA. Lawrence Seiford and Kaoru Tone have been actively involved as researchers and practitioners from its earliest beginnings. All have been deeply involved in uses of DEA in practical applications as well as in the development of its basic theory and methodologies. The result is a textbook grounded in authority, experience and substance.

An Introduction to Data Envelopment Analysis-R

Ramanathan 2003-08-18 From the Foreword: 'This book is an excellent tool for practitioners who are interested in the merits and pitfalls of the

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technique.... (The author's) research is an example of inventiveness, diligence and accuracy' - Freerk A. Lootsma, Delft Institute of Technology Data envelopment Analysis is a Mathematical Programme for measuring performance efficiency of organizational units. The organizational units, termed as decision-making units (DMU) can be of any kind: manufacturing units, a set of schools, banks, hospitals, power plants, police stations, prisons, a set of firms etc. DEA has been unsuccessfully applied to measure the performance efficiency of these different kinds of DMUs which share a common characteristic - that they are non-profit organization where measurement of performance efficiency is difficult. DEA has been employed for assessing the relative performance of a set of firms that use a variety of identical inputs-say in the case of a school: quality of students, teachers, grants etc.,-to produce a variety of identical outputs-number of students who pass the final year, average grades obtained by the students in the final year etc. DEA assumes the

performance of the DMUs by using the concepts of efficiency or productivity which is measured as the ratio of total outputs to total inputs. Also, the efficiencies estimated are relative to the best performing DMU or DMUs. The best performing DMU is given a score of 100% and the performance of other DMUs vary between 0 -100%.

Quantitative Modelling in Marketing and Management (second Edition)

-Luiz E. T. Al MOUTINHO 2015-11-06 "The field of marketing and management has undergone immense changes over the past decade. These dynamic changes are driving an increasing need for data analysis using quantitative modelling. Problem solving using the quantitative approach and other models has always been a hot topic in the fields of marketing and management. Quantitative modelling seems admirably suited to help managers in their strategic decision making on operations management issues. In social

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sciences, quantitative research refers to the systematic empirical investigation of social phenomena via statistical, mathematical or computational techniques. The first edition of "Quantitative Modelling in Marketing and Management" focused on the description and applications of many quantitative modelling approaches applied to marketing and management. The topics ranged from fuzzy logic and logical discriminant models to growth models and k-clique models. The second edition follows the thread of the first one by covering a myriad of techniques and applications in the areas of statistical, computer, mathematical as well as other novel nomothetic methods. It greatly reinforces the areas of computer, mathematical and other modeling tools that are designed to bring a level of awareness and knowledge among academics and researchers in marketing and management, so that there is an increase in the application of these new approaches that will be embedded in future scholarly output."--

Introduction to the Theory and Application of Data

Envelopment Analysis-

Emmanuel Thanassoulis

2013-06-29 1 DATA

ENVIRONMENT ANALYSIS

Data Envelopment Analysis

(DEA) was initially developed as a method for assessing the comparative efficiencies of organisational units such as the branches of a bank, schools, hospital departments or restaurants. The key in each case is that they perform feature which makes the units comparable the same function in terms of the kinds of resource they use and the types of output they produce. For example all bank branches to be compared would typically use staff and capital assets to effect income generating activities such as advancing loans, selling financial products and carrying out banking transactions on behalf of their clients. The efficiencies assessed in this context by DEA are intended to reflect the scope for resource conservation at the unit being assessed without detriment to

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its outputs, or alternatively, the scope for output augmentation without additional resources. The efficiencies assessed are comparative or relative because they reflect scope for resource conservation or output augmentation at one unit relative to other comparable benchmark units rather than in some absolute sense. We resort to relative rather than absolute efficiencies because in most practical contexts we lack sufficient information to derive the superior measures of absolute efficiency. DEA was initiated by Charnes Cooper and Rhodes in 1978 in their seminal paper Charnes et al. (1978). The paper operationalised and extended by means of linear programming production economics concepts of empirical efficiency put forth some twenty years earlier by Farrell (1957).

The Measurement of Productive Efficiency and Productivity Growth-Harold O. Fried 2008-02-04 When Harold Fried, et al. published

The Measurement of Productive Efficiency: Techniques and Applications with OUP in 1993, the book received a great deal of professional interest for its accessible treatment of the rapidly growing field of efficiency and productivity analysis. The first several chapters, providing the background, motivation, and theoretical foundations for this topic, were the most widely recognized. In this tight, direct update, these same editors have compiled over ten years of the most recent research in this changing field, and expanded on those seminal chapters. The book will guide readers from the basic models to the latest, cutting-edge extensions, and will be reinforced by references to classic and current theoretical and applied research. It is intended for professors and graduate students in a variety of fields, ranging from economics to agricultural economics, business administration, management science, and public administration. It should also appeal to public servants and policy makers engaged in

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business performance analysis or regulation.

Data Envelopment

Analysis-William Wager Cooper 2000 CD-ROM contains: DEA-Solver and sample problems -- Comprehensive bibliography.

Data Envelopment

Analysis-Wade D. Cook 2008 The current book introduces the methodology of data envelopment analysis (DEA). DEA uses mathematical programming techniques and models to evaluate the performance of peer units (e.g., bank branches, hospitals and schools) in terms of multiple inputs used and multiple outputs produced. DEA examines the resources available to each unit and monitors the "conversion" of these resources (inputs) into the desired outputs. The book gives an overview of the various models from the literature, and the geometric interpretations provided permit the reader to go beyond the mathematics. Various topics are covered

relating to important practical considerations. These include dealing with time series data as well as methods for restricting multipliers. The book will thus provide students, researchers and practitioners with a solid understanding of the methodology, its uses and its potential.

Decision Making and Performance Evaluation Using Data Envelopment

Analysis-Dariush Khezrimotlagh 2018-05-03 This book offers new transparent views and step-by-step methods for performance evaluation of a set of units using Data Envelopment Analysis (DEA). The book has twelve practical chapters. Elementary concepts and definitions are gradually built in Chapters 1-6 based upon four examples of one input and one output factors, two input factors, two output factors, and four input and three output factors. Simultaneously, the mathematical foundations using linear programming are also introduced without any

prerequisites. A reader with basic knowledge of mathematics and computers is able to understand the contents of the book. In addition, to prevent pre-judgment about the available concepts and definitions in the DEA literature, some new phrases are introduced and, after elucidating each phrase in detail in Chapters 1-6, they are reintroduced for industry-wide accuracy in Chapter 7. After that, some of the more advanced DEA topics are illustrated in Chapters 8-12, such as: production-planning problems, output-input ratio analysis, efficiency over different time periods, Malmquist efficiency indexes, and a delta neighborhood model. A clear overview of many of the elementary and advanced concepts of DEA is provided, including Technical Efficiency, Relative Efficiency, Cost/Revenue/Profit Efficiency, Price/Overall Efficiency, the DEA axioms, the mathematical background to measure technical efficiency and overall efficiency, the multiplier/envelopment form of basic DEA models in input/output-orientation, the

multiplier/envelopment of Additive DEA model, the multiplier/envelopment of slacks-based models, and others. The book also covers a variety of DEA techniques, input-output ratio analysis, the natural relationships between DEA frontier and the ratio of output to input factors, production-planning problems, planning ideas with a centralized decision-making unit, context-dependent DEA, Malmquist efficiency index, efficiency over different time periods, and others. End-of-chapter exercises are provided for each chapter.

Data Envelopment

Analysis-Joe Zhu 2016-03-22
This handbook compiles state-of-the-art empirical studies and applications using Data Envelopment Analysis (DEA). It includes a collection of 18 chapters written by DEA experts. Chapter 1 examines the performance of CEOs of U.S. banks and thrifts. Chapter 2 describes the network operational structure of transportation organizations and the relative network data envelopment analysis model. Chapter 3

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demonstrates how to use different types of DEA models to compute total-factor energy efficiency scores with an application to energy efficiency. In chapter 4, the authors explore the impact of incorporating customers' willingness to pay for service quality in benchmarking models on cost efficiency of distribution networks, and chapter 5 provides a brief review of previous applications of DEA to the professional baseball industry, followed by two detailed applications to Major League Baseball. Chapter 6 examines efficiency and productivity of U.S. property-liability (P-L) insurers using DEA, while chapter 7 presents a two-stage network DEA model that decomposes the overall efficiency of a decision-making unit into two components. Chapter 8 presents a review of the literature of DEA models for the performance assessment of mutual funds, and chapter 9 discusses the management strategies formulation of the international tourist hotel industry in Taiwan. Chapter 10 presents a novel use of the two-stage network DEA to

evaluate sustainable product design performances. In chapter 11 authors highlight limitations of some DEA environmental efficiency models, and chapter 12 reviews applications of DEA in secondary and tertiary education. Chapter 13 measures the relative performance of New York State school districts in the 2011-2012 academic year. Chapter 14 provides an introductory prelude to chapters 15 and 16, which both provide detailed applications of DEA in marketing. Chapter 17 then shows how to decompose a new total factor productivity index that satisfies all economically-relevant axioms from index theory with an application to U.S. agriculture. Finally, chapter 18 presents a unique study that conducts a DEA research front analysis, applying a network clustering method to group the DEA literature over the period 2000 to 2014.

Uncertain Data

Envelopment Analysis-

Meilin Wen 2014-07-24 This book is intended to present

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the milestones in the progression of uncertain Data envelopment analysis (DEA). Chapter 1 gives some basic introduction to uncertain theories, including probability theory, credibility theory, uncertainty theory and chance theory. Chapter 2 presents a comprehensive review and discussion of basic DEA models. The stochastic DEA is introduced in Chapter 3, in which the inputs and outputs are assumed to be random variables. To obtain the probability distribution of a random variable, a lot of samples are needed to apply the statistics inference approach. Chapter 4 and 5 provide two uncertain DEA methods to evaluate the DMUs with limited or insufficient statistical data, named fuzzy DEA and uncertain DEA. In order to evaluate the DMUs in which uncertainty and randomness appear simultaneously, the hybrid DEA based on chance theory is presented in Chapter 6.

**Handbook on Data
Envelopment Analysis-**
William W. Cooper

2011-08-23 This handbook covers DEA topics that are extensively used and solidly based. The purpose of the handbook is to (1) describe and elucidate the state of the field and (2), where appropriate, extend the frontier of DEA research. It defines the state-of-the-art of DEA methodology and its uses. This handbook is intended to represent a milestone in the progression of DEA. Written by experts, who are generally major contributors to the topics to be covered, it includes a comprehensive review and discussion of basic DEA models, which, in the present issue extensions to the basic DEA methods, and a collection of DEA applications in the areas of banking, engineering, health care, and services. The handbook's chapters are organized into two categories: (i) basic DEA models, concepts, and their extensions, and (ii) DEA applications. First edition contributors have returned to update their work. The second edition includes updated versions of selected first edition chapters. New chapters have been added on:

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different approaches with no need for a priori choices of weights (called “multipliers”) that reflect meaningful trade-offs, construction of static and dynamic DEA technologies, slacks-based model and its extensions, DEA models for DMUs that have internal structures network DEA that can be used for measuring supply chain operations, Selection of DEA applications in the service sector with a focus on building a conceptual framework, research design and interpreting results.

Handbook of Operations Analytics Using Data Envelopment Analysis-

Shiuh-Nan Hwang 2016-07-01

This handbook focuses on Data Envelopment Analysis (DEA) applications in operations analytics which are fundamental tools and techniques for improving operation functions and attaining long-term competitiveness. In fact, the handbook demonstrates that DEA can be viewed as Data Envelopment Analytics. Chapters include a review of cross-efficiency evaluation; a

case study on measuring the environmental performance of OECs countries; how to select a set of performance metrics in DEA with an application to American banks; a relational network model to take the operations of individual periods into account in measuring efficiencies; how the efficient frontier methods DEA and stochastic frontier analysis (SFA) can be used synergistically; and how to integrate DEA and multidimensional scaling. In other chapters, authors construct a dynamic three-stage network DEA model; a bootstrapping based methodology to evaluate returns to scale and convexity assumptions in DEA; hybridizing DEA and cooperative games; using DEA to represent the production technology and directional distance functions to measure bank performance; an input-specific Luenberger energy and environmental productivity indicator; and the issue of reference set by differentiating between the uniquely found reference set and the unary and maximal types of the reference set. Finally, additional chapters

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evaluate and compare the technological advancement observed in different hybrid electric vehicles (HEV) market segments over the past 15 years; radial measurement of efficiency for the production process possessing multi-components under different production technologies; issues around the use of accounting information in DEA; how to use DEA environmental assessment to establish corporate sustainability; a summary of research efforts on DEA environmental assessment applied to energy in the last 30 years; and an overview of DEA and how it can be utilized alone and with other techniques to investigate corporate environmental sustainability questions.

Extension of Data Envelopment Analysis with Preference Information-
Tarja Joro 2015-01-02 This book provides an introduction to incorporating preference information in Data Envelopment Analysis (DEA) with a special emphasis in

Value Efficiency Analysis. In addition to theoretical considerations, numerous illustrative examples are included. Hence, the book can be used as a teaching text as well. Only a modest mathematical background is needed to understand the main principles. The only prerequisites are a) familiarity with linear algebra, especially matrix calculus; b) knowledge of the simplex method; and c) familiarity with the use of computer software. The book is organized as follows. Chapter 1 provides motivation and introduces the basic concepts. Chapter 2 provides the basic ideas and models of Data Envelopment Analysis. The efficient frontier and production possibility set concepts play an important role in all considerations. That's why these concepts are considered more closely in Chapter 3. Since the approaches introduced in this study are inspired by Multiple Objective Linear Programming, the basic concepts of this field are reviewed in Chapter 4. Chapter 5 also compares and contrasts Data Envelopment Analysis and Multiple

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Objective Linear Programming, providing some cornerstones for approaches presented later in the book. Chapter 6 discusses the traditional approaches to take into account preference information in DEA. In Chapter 7, Value Efficiency is introduced, and Chapter 8 discusses practical aspects. Some extensions are presented in Chapter 9, and in Chapter 10 Value Efficiency is extended to cover the case when a production possibility set is not convex. Three implemented applications are reviewed in Chapter 11.

Data envelopment analysis methods in the management of personnel recruitment under competition in the context of U.S. Army recruiting-
David Alan Thomas 1990

Data Envelopment Analysis-William W. Cooper
2007-01-10 This volume systematically details both the basic principles and new developments in Data Envelopment Analysis (DEA),

offering a solid understanding of the methodology, its uses, and its potential. New material in this edition includes coverage of recent developments that have greatly extended the power and scope of DEA and have lead to new directions for research and DEA uses. Each chapter accompanies its developments with simple numerical examples and discussions of actual applications. The first nine chapters cover the basic principles of DEA, while the final seven chapters provide a more advanced treatment.

Network Data Envelopment Analysis-Chiang Kao
2016-08-23 This book presents the underlying theory, model development, and applications of network Data Envelopment Analysis (DEA) in a systematic way. The field of network DEA extends and complements conventional DEA by considering not only inputs and outputs when measuring system efficiency, but also the internal structure of the system being analyzed. By analyzing the efficiency of

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individual internal components, and more particularly by studying the effects of relationships among components which are modeled and implemented by means of various network structures, the “network DEA” approach is able to help identify and manage the specific components that contribute inefficiencies into the overall systems. This relatively new approach comprises an important analytical tool based on mathematical programming techniques, with valuable implications to production and operations management. The existing models for measuring the efficiency of systems of specific network structures are also discussed, and the relationships between the system and component efficiencies are explored. This book should be able to inspire new research and new applications based on the current state of the art. Performance evaluation is an important task in management, and is needed to (i) better understand the past accomplishments of an organization and (ii) plan for its future development.

However, this task becomes rather challenging when multiple performance metrics are involved. DEA is a powerful tool to cope with such issues. For systems or operations composed of interrelated processes, managers need to know how the performances of the various processes evaluated and how they are aggregated to form the overall performance of the system. This book provides an advanced exposition on performance evaluation of systems with network structures. It explores the network nature of most production and operation systems, and explains why network analyses are necessary.

Data Envelopment

Analysis-William W. Cooper
2007-05-08 In a relatively short period of time Data Envelopment Analysis (DEA) has grown into a powerful quantitative, analytical tool for measuring and evaluating performance. It has been successfully applied to a host of different entities engaged in a wide variety of activities

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in many contexts worldwide. In many cases evaluations of these entities have been resistant to other approaches because complex, multiple levels of (often) poorly understood relations must be considered. A few examples of these multifaceted problems are (1) maintenance activities of US Air Force bases in geographically dispersed locations, (2) police force efficiencies in the United Kingdom, (3) branch bank performances in Canada, Cyprus, and other countries and (4) the efficiency of universities in performing their education and research functions in the U.S., England, and France. In addition to localized problems, DEA applications have been extended to performance evaluations of 'larger entities' such as cities, regions, and countries. These extensions have a wider scope than traditional analyses because they include 'social' and 'safety-net' expenditures as inputs and various 'quality-of-life' dimensions as outputs. In other applications, DEA has been used to supply new insights into business activities and into the

methods that have been used to evaluate these activities. These include 'benchmarking' studies of professional organizations including legal and accounting societies, as well as organizational forms--such as evaluating the relative efficiencies of the 'mutual' vs. 'corporate' forms of organization that are used in the U.S. insurance industry. Finally, DEA can also be used to evaluate objects as well as governmental, business and societal activities. For example, a test study found that DEA compared favorably with traditional engineering approaches for use in evaluating the relative efficiencies of jet aircraft engines. These advantages accrued to DEA because of its ability to simultaneously handle multiple outputs and inputs without having to first specify a system of weights for use in effecting these evaluations. Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References, and DEA-Solver Software is designed to provide a systematic introduction to DEA and its uses as a multifaceted tool for

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evaluating problems in a variety of contexts. Each chapter accompanies its developments with simple numerical examples and discussions of actual applications. Emphasis is placed on the use as well as an understanding of DEA and the topics in this book have been selected and treated accordingly. The objective is to introduce students, researchers, and practitioners in business, economics, engineering, and the sciences to Data Envelopment Analysis. The authors have been involved in DEA's development from the beginning. William Cooper (with Abraham Charnes and Edwardo Rhodes) is a founder of DEA. Lawrence Seiford and Kaoru Tone have been actively involved as researchers and practitioners from its earliest beginnings. All have been deeply involved in uses of DEA in practical applications as well as in the development of its basic theory and methodologies. The result is a textbook grounded in authority, experience and substance. Please see the book's preface for chapter-by-chapter

information on specific features and information on the supporting DEA-Solver software. The preface can be found and downloaded at the internet.

Data Envelopment Analysis and Effective Performance Assessment

Lotfi, Farhad
Hossein Zadeh 2016-09-01
For any organization, analysis of performance and effectiveness through available data allows for informed decision making. Data envelopment analysis, or DEA, is a popular, effective method that can be used to measure productive efficiency in operations management assessment. Data Envelopment Analysis and Effective Performance Assessment addresses the myriad of practical uses and innovative developments of DEA. Emphasizing the importance of analyzing productivity by measuring inputs, goals, economic growth, and performance, this book covers a wide breadth of innovative knowledge. This book is essential reading for managers, business

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professionals, students of business and ICT, and computer engineers.

Evaluating Hedge Fund and CTA Performance-Greg

N. Gregoriou 2005-05-06

Introducing Data

Envelopment Analysis (DEA) --

a quantitative approach to assess the performance of hedge funds, funds of hedge funds, and commodity trading advisors. Steep

yourself in this approach with this important new book by Greg Gregoriou and Joe Zhu.

"This book steps beyond the traditional trade-off

between single variables for risk and return in the

determination of investment portfolios. For the first time, a

comprehensive procedure is presented to compose

portfolios using multiple measures of risk and

return simultaneously. This approach represents a

watershed in portfolio construction techniques and

is especially useful for hedge fund and CTA offerings." --

Richard E. Oberuc, CEO, Burlington Hall Asset Management, Inc. Chairman, Foundation for Managed

Derivatives Research Order your copy today!

Dynamics of Data

Envelopment Analysis-Jati

Sengupta 2013-11-11 Data

envelopment analysis

develops a set of

nonparametric and

semiparametric techniques

for measuring economic

efficiency among firms and

nonprofit organizations. Over

the past decade this

technique has found most

widespread applications in

public sector organizations.

However these applications

have been mostly static. This

monograph extends this static

framework of efficiency

analysis in several new

directions. These include but

are not limited to the

following: (1) a dynamic view

of the production and cost

frontier, where capital inputs

are treated differently from

the current inputs, (2) a direct

role of the technological

progress and regress, which

is so often stressed in total

factor productivity discussion

in modern growth theory in

economics, (3) stochastic

efficiency in a dynamic

setting, where reliability

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improvement competes with technical efficiency, (4) flexible manufacturing systems, where flexibility of the production process and the economies of scope play an important role in efficiency analysis and (5) the role of economic factors such as externalities and input interdependences. Efficiency is viewed here in the framework of a general systems theory model. Such a view is intended to broaden the scope of applications of this promising new technique of data envelopment analysis. The monograph stresses the various applied aspects of the dynamic theory, so that it can be empirically implemented in different situations. As far as possible abstract mathematical treatments are avoided and emphasis placed on the statistical examples and empirical illustrations.

Service Productivity

Management-H. David Sherman 2006-09-10 Here is an in-depth guide to the most powerful available benchmarking technique for improving service organization performance —

Data Envelopment Analysis (DEA). The book outlines DEA as a benchmarking technique, identifies high cost service units, isolates specific changes for elevating performance to the best practice services level providing high quality service at low cost and most important, it guides the improvement process.

Data Envelopment

Analysis-Wade D. Cook 2014-07-08 This handbook serves as a complement to the Handbook on Data Envelopment Analysis (eds, W.W. Cooper, L.M. Seiford and J. Zhu, 2011, Springer) in an effort to extend the frontier of DEA research. It provides a comprehensive source for the state-of-the art DEA modeling on internal structures and network DEA. Chapter 1 provides a survey on two-stage network performance decomposition and modeling techniques. Chapter 2 discusses the pitfalls in network DEA modeling. Chapter 3 discusses efficiency decompositions in network DEA under three types of structures, namely

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series, parallel and dynamic. Chapter 4 studies the determination of the network DEA frontier. In chapter 5 additive efficiency decomposition in network DEA is discussed. An approach in scale efficiency measurement in two-stage networks is presented in chapter 6. Chapter 7 further discusses the scale efficiency decomposition in two stage networks. Chapter 8 offers a bargaining game approach to modeling two-stage networks. Chapter 9 studies shared resources and efficiency decomposition in two-stage networks. Chapter 10 introduces an approach to computing the technical efficiency scores for a dynamic production network and its sub-processes. Chapter 11 presents a slacks-based network DEA. Chapter 12 discusses a DEA modeling technique for a two-stage network process where the inputs of the second stage include both the outputs from the first stage and additional inputs to the second stage. Chapter 13 presents an efficiency measurement methodology for multi-stage production systems. Chapter

14 discusses network DEA models, both static and dynamic. The discussion also explores various useful objective functions that can be applied to the models to find the optimal allocation of resources for processes within the black box, that are normally invisible to DEA. Chapter 15 provides a comprehensive review of various type network DEA modeling techniques. Chapter 16 presents shared resources models for deriving aggregate measures of bank-branch performance, with accompanying component measures that make up that aggregate value. Chapter 17 examines a set of manufacturing plants operating under a single umbrella, with the objective being to use the component or function measures to decide what might be considered as each plant's core business. Chapter 18 considers problem settings where there may be clusters or groups of DMUs that form a hierarchy. The specific case of a set off electric power plants is examined in this context. Chapter 19 models bad outputs in two-stage network

DEA. Chapter 20 presents an application of network DEA to performance measurement of Major League Baseball (MLB) teams. Chapter 21 presents an application of a two-stage network DEA model for examining the performance of 30 U.S. airline companies. Chapter 22 then presents two distinct network efficiency models that are applied to engineering systems.

A Neutrosophic-Based Approach in Data Envelopment Analysis with Undesirable Outputs-Xinna

Mao Data Envelopment Analysis is one of the paramount mathematical methods to compute the general performance of organizations, which utilizes similar sources to produce similar outputs. Original DEA schemes involve crisp information of inputs and outputs that may not always be accessible in real-world applications. Nevertheless, in some cases, the values of the data are information with indeterminacy, impreciseness, vagueness, inconsistent, and incompleteness. Furthermore,

the conventional DEA models have been originally formulated solely for desirable outputs. However, undesirable outputs may additionally be present in the manufacturing system, which wishes to be minimized. To tackle the mentioned issues and in order to obtain a reliable measurement that keeps original advantage of DEA and considers the influence of undesirable factors under the indeterminate environments, this paper presents a neutrosophic DEA model with undesirable outputs.

Data Envelopment Analysis for Simplified

Neutrosophic Sets-S. A. Edalatpanah In recent years, there has been a growing interest in neutrosophic theory, and there are several methods for solving various problems under neutrosophic environment. However, a few papers have discussed the Data envelopment analysis (DEA) with neutrosophic sets. So, in this paper, we propose an input-oriented DEA model with simplified neutrosophic

numbers and present a new strategy to solve it. The proposed method is based on the weighted arithmetic average operator and has a simple structure. Finally, the new approach is illustrated with the help of a numerical example.

Measuring the Impact of National Advertising on Recruiting by Data Envelopment Analysis

Methods-A. Charnes 1988 Empirical Pareto-Efficient Production Function means to assess the impact of advertising in U.S. Army Recruiting are developed utilizing Data Envelopment Analysis (DEA). Results show that service specific advertising is more effective in producing high quality army contracts. These results corroborate earlier findings by the authors based on DEA that address the joint vs. service specific advertising issue. DEA analyses need to be performed with various other service outputs and inputs to complete these developments. However, the already developed DEA

applications provide an empirical, battalion-level basis for management decisions regarding the Service-Joint advertising issue and other resource trade-offs. The rate of change measure is easily incorporated into previously developed informatics utilized for DEA. True decision support can then be provided to the recruiting command through DEA on the impact of advertising of different types, and on the allocation of other resources. Thus DEA can provide the basis of a Decision Support System which will systematically provide insights from the data while maintaining the managerial level resolution needed to implement those insights into decisions. Keywords: Advertising effectiveness, Resource allocation, Joint advertising mix experiment, Sensitivity analysis, U.S. Army recruiting command, Service advertising, Joint advertising.

Performance Measurement with Fuzzy Data

Envelopment Analysis-Ali Emrouznejad 2013-11-29 The intensity of global competition

and ever-increasing economic uncertainties has led organizations to search for more efficient and effective ways to manage their business operations. Data envelopment analysis (DEA) has been widely used as a conceptually simple yet powerful tool for evaluating organizational productivity and performance. Fuzzy DEA (FDEA) is a promising extension of the conventional DEA proposed for dealing with imprecise and ambiguous data in performance measurement problems. This book is the first volume in the literature to present the state-of-the-art developments and applications of FDEA. It is designed for students, educators, researchers, consultants and practicing managers in business, industry, and government with a basic understanding of the DEA and fuzzy logic concepts.

Data Envelopment Analysis: Balanced Benchmarking

Wade D. Cook

2013-10-20 The current book introduces the

methodology of data envelopment analysis (DEA). DEA uses mathematical programming techniques and models to evaluate the performance of peer units (e.g., bank branches, hospitals and schools) in terms of multiple performance measures or metrics. These multiple performance measures are classified or coined as DEA inputs and DEA outputs. Although DEA has a strong link to production theory in economics, the tool is also used for benchmarking in operations management, where a set of measures is selected to benchmark the performance of manufacturing and service operations. In the circumstance of benchmarking, the efficient DMUs, as defined by DEA, may not necessarily form a "production frontier", but rather lead to a "best-practice frontier". DEA's empirical orientation and absence of a priori assumptions have resulted in its use in a number of studies involving efficient or best-practice frontier estimation in the nonprofit, regulated, and private

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sectors. DEA applications involve a wide range of contexts, such as education, health care, banking, armed forces, auditing, market research, retail outlets, organization effectiveness, transportation, public housing, and manufacturing. DEA is a balanced benchmarking tool that will help organizations to examine their assumptions about their productivity and performance. The book provides students, researchers, and practitioners with a solid understanding of the methodology, its uses and potentials in business analytics.

Quantitative Models for Performance Evaluation and Benchmarking

Joe Zhu
2014-09-11 The author is one of the prominent researchers in the field of Data Envelopment Analysis (DEA), a powerful data analysis tool that can be used in performance evaluation and benchmarking. This book is based upon the author's years of research and teaching experiences. It is difficult to evaluate an organization's

performance when multiple performance metrics are present. The difficulties are further enhanced when the relationships among the performance metrics are complex and involve unknown tradeoffs. This book introduces Data Envelopment Analysis (DEA) as a multiple-measure performance evaluation and benchmarking tool. The focus of performance evaluation and benchmarking is shifted from characterizing performance in terms of single measures to evaluating performance as a multidimensional systems perspective. Conventional and new DEA approaches are presented and discussed using Excel spreadsheets — one of the most effective ways to analyze and evaluate decision alternatives. The user can easily develop and customize new DEA models based upon these spreadsheets. DEA models and approaches are presented to deal with performance evaluation problems in a variety of contexts. For example, a context-dependent DEA measures the relative attractiveness of similar operations/processes/products

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. Sensitivity analysis techniques can be easily applied, and used to identify critical performance measures. Two-stage network efficiency models can be utilized to study performance of supply chain. DEA benchmarking models extend DEA's ability in performance evaluation. Various cross efficiency approaches are presented to provide peer evaluation scores. This book also provides an easy-to-use DEA software — DEA Frontier. This DEA Frontier is an Add-In for Microsoft® Excel and provides a custom menu of DEA approaches. This version of DEA Frontier is for use with Excel 97-2013 under Windows and can solve up to 50 DMUs, subject to the capacity of Excel Solver. It is an extremely powerful tool that can assist decision-makers in benchmarking and analyzing complex operational performance issues in manufacturing organizations as well as evaluating processes in banking, retail, franchising, health care, public services and many other industries.

Environmental Data

Analysis-Zhihua Zhang

2017-01-01 Most

environmental data involve a large degree of complexity and uncertainty.

Environmental Data Analysis is created to provide modern quantitative tools and techniques designed specifically to meet the needs of environmental sciences and related fields. This book has an impressive coverage of the scope. Main techniques described in this book are models for linear and nonlinear environmental systems, statistical & numerical methods, data envelopment analysis, risk assessments and life cycle assessments. These state-of-the-art techniques have attracted significant attention over the past decades in environmental monitoring, modeling and decision making. Environmental Data Analysis explains carefully various data analysis procedures and techniques in a clear, concise, and straightforward language and is written in a self-contained way that is accessible to researchers and advanced students in science and

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engineering. This is an excellent reference for scientists and engineers who wish to analyze, interpret and model data from various sources, and is also an ideal graduate-level textbook for courses in environmental sciences and related fields. Contents: Preface Time series analysis Chaos and dynamical systems Approximation Interpolation Statistical methods Numerical methods Optimization Data envelopment analysis Risk assessments Life cycle assessments Index

Data Envelopment Analysis in the Financial Services Industry

Joseph C. Paradi 2017-11-21 This book presents the methodology and applications of Data Envelopment Analysis (DEA) in measuring productivity, efficiency and effectiveness in Financial Services firms such as banks, bank branches, stock markets, pension funds, mutual funds, insurance firms, credit unions, risk tolerance, and corporate failure prediction. Financial service DEA research includes

banking; insurance businesses; hedge, pension and mutual funds; and credit unions. Significant business transactions among financial service organizations such as bank mergers and acquisitions and valuation of IPOs have also been the focus of DEA research. The book looks at the range of DEA uses for financial services by presenting prior studies, examining the current capabilities reflected in the most recent research, and projecting future new uses of DEA in finance related applications.

Multi-Criteria Methods and Techniques Applied to Supply Chain Management

Valerio Salomon 2018-06-27 This book intends to be a complimentary reference for graduate and undergraduate courses of Business and Engineering. Readers not familiar with Multi-Criteria Decision Making (MCDM) and supply chain management (SCM) may have a first glance, reading isolate chapters. Moreover, the sequential order from

Chapters 1 to 8 may be more instructive. Readers with expertise on MCDM or SCM will find interesting applications or proposals. The book also presents a systematic literature review, which confirms the leadership of analytic hierarchy process (AHP) and data envelopment analysis (DEA).

Introduction to Data Envelopment Analysis and Its Uses-William W. Cooper
2006-03-20 Introduction to Data Envelopment Analysis and Its Uses: With DEA-Solver Software and References has been carefully designed by the authors to provide a systematic introduction to DEA and its uses as a multifaceted tool for evaluating problems in a variety of contexts. The authors have been involved in DEA's development from the beginning. William Cooper (with Abraham Charnes and Edwardo Rhodes) is a founder of DEA. Lawrence Seiford and Kaoru Tone have been actively involved as researchers and practitioners from its earliest beginnings.

All have been deeply involved in uses of DEA in practical applications as well as in the development of its basic theory and methodologies. The result is a textbook grounded in authority, experience and substance.

Modeling Data Irregularities and Structural Complexities in Data Envelopment

Analysis-Joe Zhu 2007-06-08
In a relatively short period of time, data envelopment analysis (DEA) has grown into a powerful analytical tool for measuring and evaluating performance. DEA is computational at its core and this book is one of several Springer aim to publish on the subject. This work deals with the micro aspects of handling and modeling data issues in DEA problems. It is a handbook treatment dealing with specific data problems, including imprecise data and undesirable outputs.

Data Envelopment Analysis and Its Applications to Management-Vincent

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Charles 2013-02-14 Data envelopment analysis (DEA), a non-parametric technique, has emerged as a popular management tool for measuring the performance of a set of entities, known as decision making units. This book, *Data Envelopment Analysis and Its Applications to Management*, is a collection of contributions from DEA experts from various countries. It covers a wide range of research papers from the theoretical development of DEA to its applications in various sectors such as economy, banking, education, revenue management, sports, branch networks, cities, and live stock production systems. The book is useful for researchers as well as practitioners who intend to apply DEA to their strategic and managerial decisions.

Environmental Assessment on Energy and Sustainability by Data Envelopment Analysis-

Toshiyuki Sueyoshi
2018-01-29 Introduces a bold, new model for energy

industry pollution prevention and sustainable growth
Balancing industrial pollution prevention with economic growth is one of the knottiest problems faced by industry today. This book introduces a novel approach to using data envelopment analysis (DEA) as a powerful tool for achieving that balance in the energy industries—the world’s largest producers of greenhouse gases. It describes a rigorous framework that integrates elements of the social sciences, corporate strategy, regional economics, energy economics, and environmental policy, and delivers a methodology and a set of strategies for promoting green innovation while solving key managerial challenges to greenhouse gas reduction and business growth. In writing this book the authors have drawn upon their pioneering work and considerable experience in the field to develop an unconventional, holistic approach to using DEA to assess key aspects of sustainability development. The book is divided into two sections, the first of which lays out a conventional

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framework of DEA as the basis for new research directions. In the second section, the authors delve into conceptual and methodological extensions of conventional DEA for solving problems of environmental assessment in all contemporary energy industry sectors. Introduces a powerful new approach to using DEA to achieve pollution prevention, sustainability, and business growth Covers the fundamentals of DEA, including theory, statistical models, and practical issues of conventional applications of DEA Explores new statistical modeling strategies and explores their economic and business implications Examines applications of DEA to environmental analysis across the complete range of energy industries, including coal, petroleum, shale gas, nuclear energy, renewables, and more Summarizes important studies and nearly 800 peer reviewed articles on energy, the environment, and sustainability Environmental Assessment on Energy and Sustainability by Data Envelopment Analysis is must-reading for researchers,

academics, graduate students, and practitioners in the energy industries, as well as government officials and policymakers tasked with regulating the environmental impacts of industrial pollution.

Integrated Uncertainty Management and Applications

Van-Nam Huynh 2010-03-26 Solving practical problems often requires the integration of information and knowledge from many different sources, taking into account uncertainty and impreciseness. The 2010 International Symposium on Integrated Uncertainty Management and Applications (IUM'2010), which takes place at the Japan Advanced Institute of Science and Technology (JAIST), Ishikawa, Japan, between 9th-11th April, is therefore conceived as a forum for the discussion and exchange of research results, ideas for and experience of application among researchers and practitioners involved with all aspects of uncertainty

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modelling and management.