A Stochastic Frontier Analysis Of Technical Efficiency Of

This book provides a detailed introduction to the theoretical and methodological foundations of production efficiency analysis using benchmarking. Two of the more popular methods of efficiency evaluation are Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA), both of which are based on the concept of a production possibility set and its frontier. Depending on the assumed objectives of the decision-making unit, a Production, Cost, or Profit Frontier is constructed from observed data on input and output quantities and prices. While SFA uses different maximum likelihood estimation techniques to estimate a parametric frontier, DEA relies on mathematical programming to create a nonparametric frontier. Yet another alternative is the Convex Nonparametric Frontier, which is based on the assumed convexity of the production possibility set and creates a piecewise linear frontier consisting of a number of tangent hyper planes. Three of the papers in this volume provide a detailed and relatively easy to follow exposition of the underlying theory from neoclassical production economics and offer step-by-step instructions on the appropriate model to apply in different contexts and how to implement them. Of particular appeal are the instructions on (i) how to write the codes for different SFA models on STATA, (ii) how to write a VBA Macro for repetitive solution of the DEA problem for each production unit on Excel Solver, and (iii) how to write the codes for the Nonparametric Convex Frontier estimation. The three other papers in the volume are primarily theoretical and will be of interest to PhD students and researchers hoping to make methodological and conceptual contributions to the field of nonparametric efficiency analysis.

This textbook introduces essential topics and techniques in production and efficiency analysis and shows how to apply these methods using the statistical software R. Numerous small simulations lead to a deeper understanding of random processes assumed in the models and of the behavior of estimation techniques. Step-by-step programming provides an understanding of advanced approaches such as stochastic frontier analysis and stochastic data envelopment analysis. The text is intended for master students interested in empirical production and efficiency analysis. Readers are assumed to have a general background in production economics and econometrics, typically taught in introductory microeconomics and econometrics courses.

This book covers recent advances in efficiency evaluations, most notably Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) methods. It introduces the underlying theories, shows how to make the relevant calculations and discusses applications. The aim is to make the reader aware of the pros and cons of the different methods and to show how to use these methods in both standard and non-standard cases. Several software packages have been developed to solve some of the most common DEA and SFA models. This book relies on R, a free, open source software environment for statistical computing and graphics. This enables the reader to solve not only standard problems, but also many other problem variants. Using R, one can focus on understanding the context and developing a good model. One is not restricted to predefined model variants and to a one-size-fits-all approach. To facilitate the use of R, the authors have developed an R package called Benchmarking, which implements the main methods within both DEA and SFA. The book uses mathematical formulations of models and assumptions, but it de-emphasizes the formal proofs - in part by placing them in appendices -- or by referring to the original sources. Moreover, the book emphasizes the usage of the theories and the interpretations of the mathematical formulations. It includes a series of small examples, graphical illustrations, simple extensions and questions to think about. Also, it combines the formal models with less formal economic and organizational thinking. Last but not least it discusses some larger applications with significant practical impacts, including the design of benchmarking-based regulations of energy companies in different European countries, and the development of merger control programs for competition authorities.

This book develops econometric techniques for the estimation of production, cost and profit frontiers, and for the estimation of the technical and economic efficiency with which producers approach these frontiers. Since these frontiers envelop rather than intersect the data, and since the authors continue to maintain the traditional econometric belief in the presence of external forces contributing to random statistical noise, the work is titled Stochastic Frontier Analysis. Hb ISBN (2000): 0-521-48184-8

This book provides practitioners with a step-by-step guide on how to conduct efficiency analysis using the stochastic frontier approach.

Stochastic Frontier AnalysisCambridge University Press

Stochastic Frontier Analysis Using Stata provides practitioners in academia and industry with a step-by-step guide on how to conduct efficiency analysis using the stochastic frontier approach. The authors explain in detail how to estimate production, cost, and profit efficiency and introduce the basic theory of each model in an accessible way, using empirical examples that demonstrate the interpretation and application of models. This book also provides computer code, allowing users to apply the models in their own work, and incorporates the most recent stochastic frontier models developed in academic literature. Such recent developments include models of heteroscedasticity and exogenous determinants of inefficiency, scaling models, panel models with time-varying inefficiency, growth models, and panel models that separate firm effects and persistent and transient inefficiency. Immensely helpful to applied researchers, this book bridges the chasm between theory and practice, expanding the range of applications in which production frontier analysis may be implemented.

Master's Thesis from the year 2018 in the subject Economics - Foreign Trade Theory, Trade Policy, grade: Excellent, , course: Development Economics, language: English, abstract: This study is conducted to investigate Ethiopian exports efficiency by using a stochastic frontier analysis model with panel data to estimate if countries operated at the frontier with its major trading partners. Export efficiency is defined as the ratio of actual exports to the maximum possible volume. In addition, the study investigates the factors of export efficiency, focusing on Ethiopia’s exports to its major trading partners during the period 2006 to 2017. The arable land, gross domestic product and population of Ethiopia and of the trade partner’s countries, distance between Ethiopia and trade partners’ countries, gross capital formation, and geographical location of trade partner’s countries determines the export flows of Ethiopian export. As a result the estimated coefficient of determinants shows that population and gross domestic product have significantly and positively affect the Ethiopian export sector. The empirical results show that the volume of Ethiopian actual exports is far below the estimated efficient level, and that there is

considerable room for increasing Ethiopia’s exports. The trend of agricultural export efficiency shows some improvement over the stated years while manufacturing sector shows decreases. Those findings imply that Ethiopia should search the redemption policy that enables the country to maximize the efficiency of the sector by using all possible potential.

Efficiency Analysis details the important econometric area of efficiency estimation, both past approaches as well as new methodology. There are two main camps in efficiency analysis: that which estimates maximal output and attributes all departures from this as inefficiency, known as Data Envelopment Analysis (DEA), and that which allows for both unobserved variation in output due to shocks and measurement error as well as inefficiency, known as Stochastic Frontier Analysis (SFA). This volume focuses exclusively on SFA. The econometric study of efficiency analysis typically begins by constructing a convoluted error term that is composed on noise, shocks, measurement error, and a one-sided shock called inefficiency. Early in the development of these methods, attention focused on the proposal of distributional assumptions which yielded a likelihood function whereby the parameters of the distributional components of the convoluted error could be recovered. The field evolved to the study of individual specific efficiency scores and the extension of these methods to panel data. Recently, attention has focused on relaxing the stringent distributional assumptions that are commonly imposed, relaxing the functional form assumptions commonly placed on the underlying technology, or some combination of both. All told exciting and seminal breakthroughs have occurred in this literature, and reviews of these methods are needed to effectively detail the state of the art. The generality of SFA is such that the study of efficiency has gone beyond simple application of frontier methods to study firms and appears across a diverse set of applied milieus. This review should appeal to those outside of the efficiency literature seeking to learn about new methods which might assist them in uncovering phenomena in their applied area of interest.

From the idea of efficiency raised by Koopmans in 1951, and the panel data first introduced into the efficiency analysis by Pitt and Lee (1981) and Schmidt and Sickles (1984), the techniques of stochastic frontier analysis are fast developed and the applications of stochastic frontier are widely used in different areas, such as education, industry and hospital. But most researchers focus on only one aspect, either the development of new models or empirical applications. This thesis attempts to fill the gap to get a general idea of the properties of different panel data stochastic frontier models, on both statistical aspects and economic aspects, by the comparison of different models applied to different production applications. The thesis is also attempt to shed light on whether particular panel data stochastic frontier models are better suited to different data sets. The models selected capture the simplest situation, with no heterogeneity or heteroscedasticity, and complicated ones, with exogenous variables included in the models. Not only the classical models, such as the Pitt and Lee (1981) and Battese and Coelli (1992.1995), but also the new developed models, such as the latent class model and fixed management model are detected in the thesis. On the economic aspect, the data selected captures both microeconomic and macroeconomic, with the application to the World GDP and the Italian manufacturing industry. The results show that: the panel data stochastic frontier models perform better on the microeconomic level than on the macroeconomic level; the classical models perform better than the new developed ones; some panel data stochastic frontier models make ideal assumptions but the requirements to the dataset are hard to achieve; that the influence from the exogenous variables is quite strong.