

Cross-efficiency of International Sanctions: Application of Data Envelopment Analysis and Network Methodology

Abstract. In this paper we provide the methodology for evaluating effectiveness of international sanctions using Data Envelopment Analysis (DEA), which we use for generating the network matrix for further analysis. DEA is a nonparametric technique used to compare performance of similar units, such as departments or organizations. DEA has wide applications in all industries, and has been successfully used to compare performance of hospitals, banks, universities, etc. The most important advantage of this technique is that it can handle multiple input and output variables, even those not generally comparable to each other. We use the "Threat and Imposition of Sanctions (TIES)" Data 4.0 for analysis. This database contains the largest number of cases of international sanctions (1412 from the years 1945-2005) imposed by some countries on others, takes into account simultaneous sanction imposition, and also estimates the cost of all sanctions - both for those who receive and those who impose them. As input variables for DEA model we use the impact of sender commitment, anticipated target and sender economic costs, and actual target and sender economic costs. As the output variable, we use the outcome of sanctions for senders. We describe how to use DEA cross-efficiency outputs to build the network of sanction episodes. Our proposed combination of DEA and network methodology allows us to cluster sanction episodes depending on their outcomes, and provides explanations of higher efficiency of one group of sanction episodes over the others.