A new approach to measuring eco-efficiency in generalized IO models with application to the Polish economy in transition

Topic: Classical IO applications: Multiplier and Linkage Analysis
Author: Å•ukasz Lach
Co-Authors: Henryk Gurgul

Performance assessment in the presence of undesirable outputs, such as pollutant emissions, is usually modelled within the framework of data envelopment analysis (DEA). In recent years the issue of seeking ways to increase eco-efficiency, understood as a management philosophy that aims at minimizing ecological damage while maximizing efficiency of the firm's production processes, has become one of the considerable topics of interest for both researchers and politicians. In this paper we propose a new approach to measuring eco-efficiency in generalized input-output (gIO) models which may be used as a supplementary method to traditional DEA. Unlike DEA this approach takes into account detailed data on intersectoral flows in supply- and demand-driven gIO models. The approach proposed in this paper builds upon a theory of intersectoral linkages and thus it looks at economic processes from a different perspective than the DEA-based models. We focus on cases of traditional and sector-size-adjusted measures of interindustry linkages in gIO models and in each case we suggest respective indices of eco-efficiency and prove their usefulness in policymaking. In order to illustrate possible applications of the new approach we conduct an empirical analysis aimed at identifying the eco-efficient sectors based on the 1995 and 2009 national input-output tables and environmental accounts for Poland which are provided by the WIOD database.

Keywords: generalized input-output models, intersecroral linkages, eco-efficiency, nonlinear optimization.