

Optimal Economic Restructuring Aimed at an Optimal Increase in GDP Constrained by a Decrease in Energy Consumption and CO2 Emissions

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Abstract : The objective of this paper is finding the way of economic restructuring - that is, change in the shares of sectoral gross outputs - resulting in the maximum possible increase in the gross domestic product (GDP) combined with decreases in energy consumption and CO2 emissions. It uses an input-output model for the GDP and factorial models for the energy consumption and CO2 emissions to determine the projection of the gradient of GDP, and the antigradients of the energy consumption and CO2 emissions, respectively, on a subspace formed by the structure-related variables. Since the gradient (antigradient) provides a direction of the steepest increase (decrease) of the objective function, and their projections retain this property for the functions' limitation to the subspace, each of the three directional vectors solves a particular problem of optimal structural change. In the next step, a type of factor analysis is applied to find a convex combination of the projected gradient and antigradients having maximal possible positive correlation with each of the three. This convex combination provides the desired direction of the structural change. The national economy of the United States is used as an example of applications.

Keywords : economic restructuring, input-output analysis, divisia index, factorial decomposition, E3 models

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