The analytical complementarity of input- and output-driven models: theory and practice

Topic: Methodological aspects of input-output analysis IV
Author: Aleix Altimiras-Martin

Input-driven (Ghosh) and output-driven (Leontief) models are algebraically equivalent; however, their use has not been interpreted as equivalent.
Leontief models determine the total requirements of the economy to produce specific final goods and Ghosh models have been interpreted as the economic response to using certain primary inputs.

This paper aims to clarify the “equivalence” between both models, specifically by revising the interpretation and use of input-driven models, and to show that both models can be simultaneously used to better understand the structural features of the economy.

In the theoretical part, first, the concepts of “multiple-related outputs IOT” and “multiple-related inputs IOT” are developed. They are fundamental to use output-driven models when different types of final outputs coexist (e.g. as in Physical Input-Output Tables) and to use input-driven models when different types of primary inputs coexist (as in traditional Monetary Input-Output Tables with several primary inputs rows). Second, the concepts of “product-based” and “input-based” structures are introduced to show how the same algebraic structure (i.e. the corresponding Leontief or Ghosh inverse matrices) may be used to answer different questions. In particular, the output-driven model reveals what primary inputs are required to produce a specific final output, and the input-driven uncovers in which final goods each primary input ends up.

In the practical part, the previous concepts are applied to a MIOT. It is shown that, despite being equivalent, both models reveal different structural features, as mentioned above, thus enabling different types of analyses.

The paper concludes that when a system is driven by its outputs (as an economy), only output-driven models can “drive” the system into a new state; however, within a given state, input-driven models can be used to provide complementary analyses. Thus, this paper crystallises the use of the Ghosh model, expanding the analytical options of IOA and clarifying previous work.