

FIDELIO: four modules linking input-output and general equilibrium modelling

Topic: Input-Output Theory and Methodology - I

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Research question: How can we dissociate the many different effects occurring simultaneously inside a CGE model in order to improve the interpretation of modelling results?

Method used: A modular approach including IO analysis and CGE modelling by the FIDELIO model (Fully Interregional Dynamic Econometric Long-term Input-Output)

Data used: 2015 FIGARO multi-regional Input-Output tables from Eurostat

Novelty of the research: The interpretation of CGE modelling results can be significantly improved by the dissociation of the direct, indirect, investment, re-distributional and substitution/rebound effects.

The FIDELIO model (Fully Interregional Dynamic Econometric Long-term Input-Output) answers to the recent need for more transparent economic impact assessment models. The past trend was for impact assessment models to be able to answer to all questions within one model, resulting in larger models that were built on larger databases. The counter side was that these models were becoming more and more complex (Bulavskaya et al., 2014).

The modular approach of FIDELIO can improve the transparency of complex models significantly. The FIDELIO modules can be switched on or off in order to go from a standard Input-Output model to a full econometric model and theoretically everything in between. FIDELIO shows that the two most common impact assessment tools, IO and CGE models (Koks et al., 2016), do not need to be viewed as substitutes (Rose, 1995; West, 1995), but are an integral part of a continuum of different economic models that have in common the IO-data.

In this paper we apply four so-called modules: 1. The Input-Output module estimates the direct and indirect effect by applying an Input-Output analysis; 2. The Input-Output Investment module expands from the first module and endogenizes the investment agent and activates capital accumulation. This module estimates the investment multiplier effect in addition to the direct and indirect effect; 3. The National Accounts Matrix module (also known as the Social Accounting Matrix model) endogenizes in addition households and the government. It closes the system with the redistribution of incomes and thus this module simulates in addition the re-distributional effects; 4. The full econometric module activates prices in addition to the third module and simulates the substitution and rebound effects.

A comparison of the modelling results between the four modules, allows for the dissociation of direct, indirect, investment, re-distributional and substitution/rebound effects. This modular approach thus enables an advanced decomposition of modelling results. It increases the traceability of the many effects occurring simultaneously inside a CGE model. This can significantly improve the interpretation of CGE modelling results as well as increase the understanding of a model's properties.

The proposed method will be used for an ex-ante evaluation of the Next Generation EU funds. This fund is the EU's initiative to speed up the recovery after the pandemic by investing in a more green, digital and resilient Europe. The simulation scenario will model the NextGenerationEU's spending of  723.8 billion euro on research and innovation from 2021 to 2027. Half of the budget is financed by the EU Member States, while the other half is in the form a loan. The reference

scenario will assume no NextGenerationEU fund and the individual EU Member States can use their budget for their own national investments instead. With the proposed method we not only estimate the total impact on the EU economy of this programme but also provide insights into the most relevant effects and actors related to the impact of NextGenerationEU.

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