

Input-Output Tables as Sufficient Statistics for Short-Run GDP Forecasting and Dynamic Shock Propagation: Multi-Country COVID-19 Evidence from a Darwinian Agent-Based Simulator and FIGARO Data

Topic: Input-Output Modelling: Trade and Global Value Chains policies (4)

Author: Martin Jaraiz

Co-Authors: Ruth Pinacho

Abstract

How much macroeconomic information is contained in a single input-output table? We feed FIGARO 64-sector symmetric industry-by-industry tables into DEPLOYERS, a Darwinian agent-based simulator, and use the result for both genuine out-of-sample GDP forecasts and dynamic shock-propagation simulations. The I-O table is essentially the only input: no time series, no estimated parameters, no expectations formation, no external forecasts.

A 9-year Austrian panel (2010–2018) achieves overall MAE 1.22 pp; for the five non-crisis years, MAE falls to 0.42 pp—comparable to the best Austrian institutional forecasters (WIFO 0.52 pp, institutional average 0.54 pp). Among 37 tested FIGARO countries, 33 converge with zero parameter changes. Emergent firm size distributions match European Commission business demography (87.6% micro, 10.8% small, 1.6% medium for AT) without any calibration to micro targets.

The same I-O backbone serves a dual purpose: it also faithfully propagates encoded exogenous shocks through the production network. A four-country COVID-19 case study (Austria, United Kingdom, Canada, Germany) reproduces empirical trajectories across a 19-month timeline plus 15 months of pure forecast through Q4 2022 using the same lockdown-scope + empirical-wealth-MPC methodology in all four countries. For Austria, the 4-seed ensemble reproduces the empirical Q2'20 trough to within 0.97 pp of Eurostat and the Q4'22 long-run recovery to within 0.96 pp. For the UK, Canada and Germany the same configuration achieves Q2'20 trough gaps of 3.0, 3.5 and 4.1 pp respectively.

These results suggest FIGARO I-O tables are informationally adequate for both short-run forecasting and crisis simulation. Forecast accuracy provides an external validation of FIGARO compilation methodology, complementing internal consistency checks. Since FIGARO covers 46 countries with identical methodology, the approach is immediately portable.

Keywords: input-output tables, FIGARO, macroeconomic forecasting, agent-based model, sufficient statistics, out-of-sample, shock propagation, COVID-19

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