Closing input-output models using Figaro: assessing best methods and practices

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Current economic impact analysis often estimates both the indirect and the induced impacts of shocks in national and regional economies, therefore integrating household consumption or other components as endogenous as a complement to the traditional open input-output model. Indeed, closing an inputâ€“output (IO) model with respect to households is a foundational step in extending the standard demand-driven framework beyond purely interindustry linkages and somehow incorporating in the model an idea that has long been part of economic theory â€“ by increasing income, you increase consumption and that impacts industry output and therefore income again. Closing the model internalizes this circular flow by moving households from final demand into the endogenous system, allowing the model to capture induced effects alongside direct and indirect effects. This transformation is central to multiplier analysis and to the interpretation of IO systems as representations of the broader incomeâ€“expenditure circuit linking production, income generation, and demand.

Despite its conceptual appeal, there is no single accepted procedure for closing IO models. Recent methodological work (Emonts-Holley et al., 2021) shows that Type II multipliers -those incorporating induced household effects â€“ vary systematically with the representation of household income, consumption, and value-added flows. From a modelling point of view, there are different formulations when it comes to the way you compute consumption coefficients that go within the technical coefficient matrix, the A matrix. There are different suggestions for using Value-added components: some assume total value-added, others assume wages, and still others assume wages plus other redistribution income. As a result, alternative closure strategies produce empirically non-trivial differences in multipliers. In some cases, practitioners and modelers create type II multipliers by endogenizing not only households but also government expenditures, including tax collection and gross capital formation. Comparative analyses demonstrate that commonly used closure methods can diverge substantially, underscoring both the practical importance of method selection and the need for clearer guidance to practitioners.

This paper proposes a different empirical strategy for evaluating closure methods. Rather than comparing multiplier magnitudes alone, we test the predictive performance of alternative closures using the FIGARO database. This database has the advantage that we can estimate if and what form of type II closing method is actually closer or further from allowing the estimation of next period output. In operational terms, we compute multiple versions of the closed Leontief inverse matrix L_tunder different household endogenization approaches and apply observed changes in final demand between two distinct periods. We then assess which closure specification for period-t structures most accurately reproduces realized output levels in period t+1. By reframing closure selection as a forecasting problem, this approach evaluates methods based on their ability to approximate actual economic dynamics rather than solely on their internal consistency or theoretical plausibility. This design allows us to compare closure assumptions on empirical grounds and to identify which specifications best capture the transmission of demand shocks through income-consumption feedbacks.

The contribution is both methodological and applied. Induced effects and Type II multipliers are widely used in regional and policy impact analysis, where they often play a decisive role in reported total impacts. Yet practitioners typically select closure rules based on convention, data availability, or software defaults rather than systematic evidence. By benchmarking closure methods against observed intertemporal outcomes, our framework provides a transparent criterion for choosing among competing specifications and highlights where standard approaches may over or understate

impacts. More broadly, the results inform ongoing efforts to refine IO-based analysis by identifying which closure assumptions are most robust. This is particularly relevant as IO datasets are becoming widely used and interest in economic impact analysis grows. This paper opens new avenues and is part of the effort to recenter the current academic discussion on the need for continued development of empirically grounded closure techniques suited to demand shocks applications.