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FILIPÉ SILVA / CARLOS CARREIRA

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Input-output Modelling Based on Total-Use Rectangular Tables: Is this a Better Way?

Ana Sargento / Pedro Nogueira Ramos / Geoffrey Hewings
Politecnico Institute of Leiria – School of Technology and Management; Faculty of Economics – University of Coimbra; Regional Economics Applications Laboratory – University of Illinois at Urbana-Champaign (USA).

abstract resumo

Input-output tables can be presented in different formats, according to three main criteria: 1) symmetric or rectangular format; 2) total or domestic-use flows and 3) valuation prices (basic prices – bp or purchasers’ prices – pp). Official National Accounts (at least in EU) produce in a regular base a total use rectangular table at pp – also known as the Make and Use (M&U) format – that is different from the lay-out upon which traditional input-output models were developed (domestic use, symmetric, bp). The problem with this latter one is of course that it is only available at times in many countries. The objective of this paper is to prove (under common hypotheses) the equivalence between two alternative procedures, from the point of view of the results of an input-output model: 1) to convert the M&U input-output table into the traditional format – a domestic-use symmetric table at bp – and then implement the model; 2) to perform the direct modelling of the original table (the total-use rectangular table at pp). That equivalence is illustrated with Portuguese data for the year 2002.

Os quadros de Input-output podem obedecer a diferentes formatos, consoante três critérios principais: 1) formato simétrico ou rectangular; 2) inclusão ou não de produtos importados nos fluxos de uso; 3) sistema de valorização de preços (preços de base ou preços de aquisição). Pelo menos na UE, os quadros produzidos numa base regular por parte das Contas Nacionais oficiais são quadros de fluxos totais (incluindo importações), rectangulares e a preços de aquisição. Este é um formato diferente daquele em que os modelos tradicionais de input-output foram desenvolvidos (fluxos domésticos, simétricos, a preços de base). Obviamente, o problema é que, em muitos países, os quadros de input-output com essas características são disponibilizados apenas não regularmente. O objectivo deste artigo é provar a equivalência, sob hipóteses comuns, entre dois procedimentos alternativos: 1) converter a matriz de input-output rectangular no formato tradicional – matriz simétrica, de fluxos domésticos e a preços de base – e só depois implementar o modelo; 2) desenvolver o modelo directamente a partir do quadro original (rectangular, com fluxos totais e preços de aquisição). Esta equivalência é demonstrada usando dados das matrizes portuguesas, para o ano 2002.

JEL Classification: C67, E01.
Input-output tables can be classified according to three main criteria: 1) symmetric or rectangular format; 2) total use or domestic use flows and 3) valuation of goods and services. As a rule, the classical literature on input-output is based on symmetric matrices, with domestic flows, at basic prices. By a symmetric format we mean that the inner part of the input-output table has the same products or the same industries in its rows and columns. As a hypothesis, the classic Leontief tables assumed that each industry produced one and only one product. In input-output jargon, those tables depict product-by-product or industry-by-industry relationships. Remark, however, that in fact each industry may produce several secondary products beyond its main product that is referred in its denomination. Yet, since the end of the 1960’s, when the United Nations introduced the 1968 System of National Accounts, countries are recommended (at the national level) to compile and publish the input-output tables on a rectangular, or Make and Use format as it is known as well. In these tables the above-mentioned classical restrictive hypothesis is avoided. The idea is to combine two tables to depict Supply (or Make) and Use product-by-industry relationships. The Use matrix gives information on product consumption made by industries and final users. As to the Make matrix, its columns depict how the various industries contribute to the products’ output, while reading along the rows it gives us the distribution of each industry’s output over the several products: the primary product of that industry and its various secondary products. Since the number of products included in the model may be higher than the number of industries, this format is called rectangular.

As for the total or domestic-use criterion that refers to the type of flows represented in the intermediate transactions that are part of the Use table and also in the several components of the final demand. Intermediate consumption of products (made by industries) and final uses (made by households, government, firms and foreign countries) involve the use of products which are not only domestically produced, but are also imported. A total-use table records the whole amount of inputs used, whether these have been produced within the country (or the region, depending on whether we are dealing with a national or a regional model) or imported. Conversely, if intermediate and final use flows are expurgated from the value of imported products, then we are facing a domestic (or intra-regional) use table.

Finally, the third criterion is related to the different prices at which goods and services may be evaluated. Current input-output tables may involve two different price systems: basic prices (bp), the closest to the value of production factor costs, or purchasers’ prices (pp), which include taxes on the products (deducted from subsidies) and trade and transport margins.

Combining these criteria in several manners, many different types of input-output tables can be constructed. However, in practice, the starting point to the construction of these tables is usually the total flow Make and Use (M&U) rectangular table at purchasers’ prices, since this is the standard format in which statistical information is gathered and published by official statistical institutes, that follows the recommendations of international National Accounts manuals.

The main issue that this paper deals with is whether there is any benefit, for modelling purposes, in relying upon a domestic use symmetric table, or it is equivalent to implement the model directly from the total use rectangular table. That means that we aim to compare two different procedures for input-output modelling, when the original data is produced and available on a total use rectangular format: 1) firstly convert the table into a domestic use symmetric table at basic prices, and then implement the model or 2) perform the direct modelling of the total use rectangular table at purchasers’ prices, i.e., implementing the model on the basis of the table in its original format.

Many authors have thought the first procedure as the most adequate for input-output model applications. For example, in what respects the symmetric feature of the table, the EUROSTAT itself advocates in its Input-output manual that «For analytical purposes a relationship is needed