

Input–Output Analysis

This essential reference for students and scholars in the input–output research and applications community has been fully revised and updated to reflect important developments in the field. Expanded coverage includes construction and application of multiregional and interregional models, including international models and their application to global economic issues such as climate change and international trade; structural decomposition and path analysis; linkages and key sector identification and hypothetical extraction analysis; the connection of national income and product accounts to input–output accounts; supply and use tables for commodity-by-industry accounting and models; social accounting matrices; non-survey estimation techniques; and energy and environmental applications. *Input–Output Analysis* is an ideal introduction to the subject for advanced undergraduate and graduate students in many scholarly fields including economics, regional science, regional economics, city, regional and urban planning, environmental planning, public policy analysis, and public management.

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Preface

We started working on the first edition of this book (Miller and Blair, 1985) in the late 1970s. At that time, input–output as an academic topic (outside Wassily Leontief’s Harvard research group) was a little more than 25 years old – approximately 1952–1979. We use 1952 because that was when the first author was introduced to input–output analysis in a sophomore-year economics class at Harvard taught by Robert Kuenne, who later claimed that was the first time input–output had been included (anywhere) in an undergraduate economics course.

In 1962, the first author joined the faculty of the Regional Science Department at the University of Pennsylvania (Penn). He was asked by then department chair Walter Isard to teach the graduate course in linear models for regional analysis; this was to include a strong input–output component. At that time, coverage of the topic in texts was to be found primarily in two chapters of Dorfman, Samuelson and Solow (1958), in Chenery and Clark (1959), in Stone (1961), and in a long chapter on input–output at the regional level in Isard *et al.* (1960); later there were texts by Miernyk (1965), Yan (1969), and Richardson (1972).

The second author of the current text began teaching an applied course covering extensions of the input–output approach to energy, environmental, and other contemporary policy issues of the time in that same regional science program at Penn in the early 1970s, and by the end of that decade the need for a comprehensive and up-to-date textbook became apparent to us. The first edition of this book very much reflected our shared experiences with students (primarily graduate or undergraduate submatriculants) in mostly regional science and public policy courses at Penn during the 1960s and 1970s. In addition to the basics (“foundations”), many of the additional topics we included (“extensions”) reflected our research interests at that time – interregional feedbacks for one of us, energy and environmental applications for the other, and spatial aggregation in many-region models as a joint interest.

As input–output analysis developed as a discipline, both in research and practice, the need for an update to the original 1985 text materialized and the second edition was published in 2009 (Miller and Blair, 2009). Over the past decade, applications of input–output to contemporary economic issues matured quickly, and with the pace of development it became clear that we should consider another new edition to chronicle

these developments. We began to take this notion seriously around 2017 – now more than six decades into the input–output timeline.

In this new edition, we have updated, expanded, and/or refined the discussion of the following:

- The construction and application of multiregional (MRIO) and interregional (IRIO) models, including international models and their application to global economic issues such as climate change and international trade;
- Structural decomposition analysis (SDA), including additive and multiplicative forms, multiplier matrix decompositions, and structural path analysis;
- Linkages and key sector identification;
- National income and product accounts (NIPAs) and their connection to input–output accounts;
- Supply and use tables for commodity-by-industry accounting and models;
- Social accounting matrices (SAMs) and their connection to input–output data;
- Location quotients and related techniques for estimating regional technology coefficients with available sources of data;
- Energy and environmental applications including applications to contemporary issues such as global climate change, embodied energy and pollution in international trade, and the concept of an environmental footprint using input–output analysis;
- The hypothetical extraction approach to linkage analysis;
- Estimating interregional flows;
- Hybrid methods for estimation of transactions and trade flows; and
- The historical background and context for Leontief’s work.

The historical material on US input–output data has been reworked and updated, especially to reflect the international movement toward commodity supply and industry use formulations, and is included as part of the supplementary website accompanying this text at two levels of aggregation for the convenience of students and practitioners.

With appreciation we acknowledge many helpful conversations, face-to-face and electronic, with many colleagues around the world over the years, including Takahiro Akita, William Beyers, Anne Carter, Dick Conway, Faye Duchin, Geoffrey Hewings, Takeo Ihara, Satoshi Inomata, Andrew Isserman, Randall Jackson, Louis de Mesnard, Jan Oosterhaven, Mark Planting, Karen Polenske, Joseph Richter, Jeffery Round, José Rueda-Cantuche, and Guy West.

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