Input-Output Analysis


The state of the art in input-output has always been presented at the occasion of national and international input-output conferences. Many volumes which collect some or all of the contributions to these conferences exist. CARTER and BRODY (1970) have edited two volumes of selected contributions presented at the Fourth International Conference on Input-Output Techniques. Volume one contains chapters on dynamic analysis, structural change, interregional analysis, price analysis and demographic accounting and modelling. Highlights
One branch of input-output analysis, which has already become a subject in itself, is Computable General Equilibrium (CGE) analysis. Its foundation and starting point is JOHANSEN (1964). The statistical basis of his multi-sectoral study of economic growth is an input-output table. The theoretical foundation of the CGE-model is the concept of short-term general equilibrium. The analysis assumes full employment of labour and capital equipment; the two kinds of factors are taken to be perfectly mobile between sectors. Production possibilities of each sector are defined by a set of Cobb-Douglas production functions. The distribution of income is governed by the marginal productivity principle. Consumers’ demand depends on disposable income and prices. Total investment is taken to be regulated by economic policy and is given from outside. The CGE model determines sectoral shares of employment of capital and labour, relative prices and changes in production.

The input-output approach is primarily designed for empirical applicability and is therefore based on some restrictive assumptions. One of these assumptions is that a sector uses inputs in fixed proportions (given technical input-output coefficients); this defines away the problem of the choice of technique. The volume edited by KOOPMANS (1951) contains several articles which demonstrate that the input-output model has a greater generality than its assumptions concerning fixed coefficients might suggest at first. Given the rate of interest or the rate of profit, constant returns, a single primary factor (homogeneous labour) and no joint production, the Non-substitution Theorem holds, i.e. the (optimal) coefficients of production will, in the long-run, assume a constant value and, consequently, relative prices are independent of demand. Samuelson proved the Non-substitution Theorem using differentiable production functions. Koopmans, Arrow and Georgescu-Roegen restated Samuelson’s results within the more general framework of activity analysis.

KURZ, DIETZENBACHER and LAGER (1998) edited three volumes containing selected articles on input-output analysis. Part I of the Volume I is devoted to historical roots and the foundation of input-output analysis. In part II some important contributions to the theory and
the application of dynamic input-output analysis are reprinted. Part III consists of selected articles on multiplier analysis, demographic accounting and modelling and extended input-output models which take account of the demand for labour, the generation of income and consumers’ expenditure. Volume II contains four parts. Part I is concerned with input-output studies of energy demand and environmental models. Part II is devoted to the analysis of foreign trade and international models. Part III deals with regional and interregional input-output tables and models. Part IV is concerned with methods which recast make and use matrices into the usual form of square sector by sector matrices used in input-output analysis. Volume III contains three parts. The first of them contains papers on ‘structural analysis’. The second part deals with price models. Part III takes account of the labour intensive process and the various methods used in compiling, projecting and forecasting of input-output data.

Input-Output Analysis is an empirical tool introduced by Wassily LEONTIEF in the late 1930s designed to take account for the interdependencies of industries in the economy. Actually, the underlying idea of circular flow is much older and can be traced back to the old Physiocrats and the classical economists. LEONTIEF et. al. (1953) is a comprehensive report which contains the results elaborated by the Harvard Research Project on the Structure of the American Economy established in 1948 and closed in 1972. This volume deals with some important aspects of input-output analysis and contains chapters on static and dynamic theory, extension of input-output techniques to interregional analysis, problems of classification and aggregation and some more applied studies, such as analyses of the cotton textile industry or the commercial air transportation in the United States.

LEONTIEF (1986) is a collection of some essays published by that author during forty years. It contains early publications such as an essay on wages, profits, prices and taxes published in 1947 as well as articles on multiregional and environmental input-output analysis and on dynamic modelling. It contains also some results of Leontiefs investigations into the structure of American foreign trade. He found that US exports are less capital intensive than US imports. Thus, following the Heckscher-Ohlin-Theorem, one would have to conclude that, compared to the rest of the world, the U.S. economy is characterized by a relatively high labour- than capital endowment. This finding, which contradicts the empirical fact that the U.S. possessed, at that time, more capital per worker than any other country, was later labelled ‘the Leontief paradox’. 
MILLER and BLAIR (1985) is one of the most comprehensive English textbooks on input-output analysis. It contains chapters on the theoretical foundation of the input-output method, multiplier analysis, extensions to regional, interregional and multiregional input-output analysis and discusses energy and environmental modelling. The volume also deals with data related topics such as the temporal stability of input-output coefficients as well as methods to update or to project these coefficients. Two appendices, one devoted to the basics of matrix algebra and the other presenting some input-output tables of the U.S., complete the volume.

MILLER, POLENSKE and ROSE (1989) include 22 selected essays out of about 200 papers given at three conferences held in 1986 in honour of Wassily LEONTIEF and Walter Isard. One of the most interesting extensions of Leontief’s basic model concerns the combination of large scale macro models based on econometric estimates and the multisectoral approach to production provided by the input-output method. Some papers which attempt to join the two methods are included in Part I of the volume. Alternative accounting frameworks are discussed in Part II. Part III is concerned with input-output multiplier analysis that does also include the generation of income and the expenditure of private households. Regional, interregional and international models are discussed in Part IV. Input output is always concerned with data issues such as measurement errors, data availability, sensitivity analysis or forecasting procedures. This is accounted for in Part V of the volume. Part VI finally is devoted to the measurement and to the analysis of technological change.

STONE (1970) brought together a collection of his own essays which reflect his broad interests and comprehensive contributions. Sixteen out of nineteen papers are devoted to economics and economic statistics. Not all of them deal with either one or another aspect of input-output. The first paper gives an highly simplified and condensed summary of the Cambridge Growth Model. The next two papers deal with foreign trade and the balance of payments. Reflections on consistent forecasting in multi-sector models and input-output projections with special reference to price and quantity structures are dealt with in paper IV and V. The great importance which is given to national accounting - six papers deal with the subject - reflect Stone’s interest in these issues. The origin, the developments and the analytical use of national accounts are discussed in some detail. The last three papers are concerned with socio-demographic issues and demonstrate that the input-output method provides a useful instrument to deal also with these issues.