Wassily Leontief and His Contributions to Economic Accounting

PROFESSOR WASSEY LEONTIEF, the founder of input-output (I-O) accounts, died last month. During his illustrious career, he contributed to many areas of economic research, including international trade theory, business cycle theory, and capital theory. But he is best known for the creation and refinement of input-output analysis, which has fundamentally influenced the evolution of economic analysis and economic accounts.

The technique, which details the structure of the economy through a matrix of input-output coefficients, is so integral to both that in 1973, he was awarded the Nobel Prize in Economics for its development. In the United States, the major economic accounts produced by the Bureau of Economic Analysis (BEA) use the input-output accounts as an integrating principle or as an analytical tool. This use of I-O accounting is paralleled in the System of National Accounts (SNA)—the international guidelines for economic accounts. The SNA uses I-O accounting as a framework for coordinating and checking the conceptual and statistical consistency of the accounts and for providing a detailed basis for analyzing industries, products, and other economic relationships.

Leontief emigrated from the Soviet Union to Germany, where he received his doctorate in 1928. He came to the United States in 1931, worked briefly at the National Bureau for Economic Research, and then joined the Harvard University faculty. After staying at Harvard for 45 years, he founded the Institute for Economic Analysis at New York University.

Leontief's earliest work contained elements of input-output accounting, but he developed his first I-O tables in the United States in order to facilitate his study of the effects of technological change on the American economy. He collected detailed information—often from interviews with industry engineers—about production processes and constructed a matrix that described the transactions of more than 40 economic industry groups or sectors. The completed matrix revealed the interindustry relationships of inputs and outputs from which coefficients could be derived so that the direct and indirect effects of changes in the economy could be traced throughout the economy.

Leontief continued to apply I-O accounts to the study of practical economic questions throughout his career. One of his primary interests was in the application of the technique to defense analyses. His interest in this area began during World War II, when he worked with the Bureau of Labor Statistics (BLS) staff to construct I-O accounts for the United States that could facilitate the planning of post-war demobilization. This U.S. matrix was also used to guide the construction of hypothetical I-O accounts for Germany that were used by the Office of Strategic Services to plan wartime activities.

After the war, interest in I-O accounts grew quickly in the United States and elsewhere, as their usefulness for policy making in both centrally planned and free-market economies was recognized. As the I-O accounts were developed, their usefulness as an integrating tool for, and a check on the accuracy of, other economic accounts also became increasingly apparent. In fact, by 1957, input-output tables were being regularly constructed in the United Kingdom, Norway, Denmark, the Netherlands, Italy, Canada, and Japan. The first U.S. I-O accounts were produced by BLS in 1952. BEA's first I-O table, for 1958, was released in 1964. Since then, BEA has published I-O accounts for all the years covered by the economic censuses (the primary source of data for the accounts).

Given the impact of the I-O technique on economic accounting, it is interesting to note that Leontief's initial motivation had little to do with improving economic accounts. In a recent interview, he explained that national income analyses were "not very disaggregated. Everything gives you one figure, while I thought that to understand the operation of the system, one figure is not enough.... I was not interested in improving the system; I was just concentrating on understanding how it works." But Leontief's creation of Input-output accounts was not driven solely by the practical requirements of his own research. On the contrary, Leontief considered himself a theorist, but he felt strongly that the purpose of theory was to provide

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a simplified picture of real systems, so he opposed the growing tendency among economists to formulate theories without a firm foundation in observable reality. Indeed, in his 1970 presidential address to the American Economic Association, Leontief warned of the "palpable inadequacy of the scientific means" with which economists try to analyze economic problems.3

His emphasis on the need for detailed data to support theory is similar to the scientific method that underlies the physical sciences, but Leontief noted one important difference: "In contrast to most physical sciences, we study a system that is not only exceedingly complex but is also in a state of constant flux.... Without a constant inflow of new data the existing stock of factual information becomes obsolete very soon. ... What a contrast with physics, biology, or even psychology, where the magnitude of most parameters is practically constant and where critical experiments and measurements don't have to be repeated every year!"6 While this emphasis may have been unusual during a time when abstract or speculative economic theory was gaining widespread acceptance, Leontief's perspective actually led him to share many of the criticisms of the economic profession held by other economists.

Leontief devoted considerable attention to economic statistics and, in his presidential address, discussed many of the issues—such as budgets, decentralization, and classification—that economic accountants are still struggling with today. He recognized that shifting from abstract theory and "casual empiricism" to the "systematic large-scale factual analysis" that he envisioned would not be easy and would require a sizable increase in resources for economic statistics in order to keep pace with the growing complexity of the economy. He supported the decentralized Federal statistical system because he felt that it worked well and that it had the advantage of having specialized information collected by those most closely associated with it. However, he insisted on the need for uniform statistical system because he felt that it worked well and that the framework of choice for satellite accounts that economic accountants have found—the construction of satellite, or supplemental, accounts. The ability of the Economic Accounts of the United States' input-output accounts to regional impact analysis. By the 1970's, BEA had introduced its Regional Input-Output Modeling System (RIMS), which is derived from the I-O tables.11

More recently, a new application of the I-O accounts has been found—the construction of satellite, or supplemental, accounts. The ability of the I-O framework to provide detail and to reveal the relationships between industries and products has made it the framework of choice for satellite accounts that focus on providing more information about a particu—

ular sector or activity, BEA used an I-O framework in its construction of its integrated economic and environmental satellite accounts, its transportation satellite accounts, and its travel and tourism satellite account. 12

The I-O accounts are also essential to other BEA programs. They are the primary source of data for the national income and product accounts (NIPA's): During each comprehensive NIPA revision, the results of the most recent benchmark I-O accounts are incorporated into the NIPA's for that reference year, and other years are revised as required. In addition to this "benchmarking" role, the I-O accounts provide a method for checking the accuracy of the NIPA's and the balance of payments accounts. Leontief commended this increased accuracy as a great advantage of integrating I-O accounts with the other national accounts.

Leontief also had a more direct connection to BEA. He actively supported BEA's Foreign Training Program, which offers economic accounting classes to employees of foreign statistical agencies. In fact, the students regularly visited Leontief, and he always shared his experiences enthusiastically.

These visits, his recent interviews, and his dedication to his work until the time of his death illustrate how much Professor Leontief enjoyed economics—both theoretical and empirical. Indeed, it is to the benefit of the entire field that he did.

Selected Bibliography of Wassily W. Leontief


For a more complete bibliography of Professor Leontief's work, see Duncan Foley, "An Interview with Wassily Leontief," Macroeconomic Dynamics 2 (1998): 116–140.