

*At a Meeting of the Faculty of Arts and Sciences on October 15, 2002, the following Minute was placed upon the records.*

### **WASSILY LEONTIEF**

Born: August 5, 1906

Died: February 5, 1999

Wassily W. Leontief was born in St. Petersburg in 1906, and studied at the university there (then named the University of Leningrad) and at the University of Berlin (Ph.D., 1928). He migrated to the United States in 1931 as a research economist at the National Bureau of Economic Research. After two years he was offered and accepted an appointment in the Harvard economics department where he rose through the professorial ranks, retiring in 1975 as the Henry Lee Professor of Economics. During the forty-four years he taught at Harvard, Leontief became one of the most celebrated economists in the world. He invented and developed input-output analysis, for which he was awarded the Nobel Prize in 1973.

His publications record began in 1925, while he was a student at the University of Berlin, and extended over a hundred titles and seventy years, until he was past ninety. He published his first input-output paper in 1937, aged thirty. All his papers are imbued with his persistent preoccupation: economics is an empirical, applied subject. Theoretical models, no matter how elegant, are only the first stage of an economist's task; the work is incomplete until the theoretical entities have been translated into reliable quantitative estimates. Leontief set this standard for himself years before electronic computers could handle masses of data.

In developing input-output analysis, Leontief undertook to describe and analyze numerically the industrial structure of a national economy. Leon Walras had set out the general-equilibrium structure of the economy algebraically in 1874, but no one before Leontief had touched the task of implementing Walras' equations numerically. He faced major obstacles, both conceptual and empirical. The conceptual obstacles lay in the mathematical complexity of the theory, which required strategic simplifications. Leontief cut through this with boldly chosen simplifying assumptions, especially that inputs could not be substituted for each other—practically, that the observed amount of such substitution in the typical industry is small enough to be ignored.

The other obstacles were empirical. First, in the model the sum of each industry's inputs is equated to the sum of its outputs, including sales to other industries. Data on these interindustry flows of intermediate goods were not then collected by government statistical agencies. A modest grant from the Harvard University Committee on Research in the Social Sciences enabled him to engage graduate students to compile the needed input coefficients. Second, to solve the model required solving a set of simultaneous equations, one per industry making up the economy. In the 1930s computers that could routinely perform this task lay two decades in the future. Leontief's computational breakthrough was owed to Charles Wilbur of MIT, who was developing a mechanical computer that could solve up to nine simultaneous linear equations in the breathtaking time of three or four hours. Leontief resignedly shrank his model to nine productive sectors in order to fit the capabilities of Wilbur's solver. The first paper based on the input-output model was published in 1937, opening a new field of empirical economics and indeed pioneering large-scale

empirical research in the discipline. For the ensuing sixty-odd years, Leontief continued to develop input-output analysis and to apply it to a wide range of economic problems including, for instance, the consequences of world-wide economic growth for emissions of greenhouse gasses and chlorinated hydrocarbons. The use of input-output analysis for public policy has diminished along with the role of governmental planning of the national economy. However, input-output analysis provided an entry into computable general equilibrium analysis, which informs a wide and flexible assortment of economic policy issues.

Inevitably, the discovery of input-output analysis overshadowed Leontief's numerous other achievements. In a 1953 paper he applied input-output analysis to test conventional views about the basis for United States comparative advantage in international trade. His surprising result—that the US seemed to export labor-intensive goods and import capital-intensive goods—kept a generation of international economics specialists busy solving all the technical problems that arise in testing comparative advantage and making the necessary empirical measurements.

Despite his devotion to empirical economics, Leontief was a powerful theorist with wide-ranging interests both in economics and beyond. As an economist, he was perpetually irritated by economists' glib and uncritical acceptance of vague, unmeasurable concepts, as in his 1938 paper on "Implicit theorizing" and his presidential address to the American Economic Association attacking "Theoretical assumptions and nonobserved facts," thirty-three years later. As a humane, concerned citizen, he became increasingly disenchanted in the later decades of his career with the gap between the complacent portrayal in textbooks of the performance of an unplanned, free exchange economy and the failure of actual economies to meet the aspirations of the bulk of their workers.

His principal effort beyond the bounds of economics was his eleven-years service as chair of the Harvard Society of Fellows, presiding urbanely over their weekly dinners and wide ranging discussions.

In 1975, Leontief, then on the eve of statutory retirement, accepted an invitation to move to New York University. There he established the Institute of Economic Analysis and directed it until his retirement seventeen years later. His most ambitious project during those years was an attempt, sponsored by the United Nations, to project economic development world-wide for the rest of the twentieth century. In this analysis he divided the world into fifteen regions, each with its own input-output structure, and each linked by international trade and investment to form a world-wide model. A reminder of the transience of public concerns is that, while each regional model allowed for the environmental effects of population and economic growth, the world model never addressed the possibility of global climatic change.

After retiring from most academic responsibilities, Leontief remained active in economic research and publication almost until his death in February 1999.

Respectfully submitted,

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James S. Duesenberry

Robert Dorfman, Chair