OBITUARY

Arthur S. Goldberger

Econometrics, economics, and the social sciences lost a researcher and teacher of the highest order with the death of Art Goldberger on December 11, 2009.

Goldberger was born in Brooklyn, New York in 1930. He received his B.S. in economics from New York University in 1951 and his Ph.D. in economics from The University of Michigan in 1958. After three years as an assistant professor at Stanford, he came to the University of Wisconsin-Madison in 1960 as an associate professor and joined an elite group of econometricians in the recently formed Social Systems Research Institute. He was promoted to professor in 1963, became the Harold M. Groves Professor in 1970, and was named Vilas Research Professor in 1979. He became a fellow of the Econometric Society in 1964, the American Statistical Association in 1968, the American Academy of Arts and Sciences in 1977, and the American Association for the Advancement of Science in 1982. He was named a member of the National Academy of Sciences in 1986, a distinguished fellow of the American Economic Association in 1987, and a foreign member of the Royal Netherlands Academy of Science in 1991. He retired from Wisconsin in 1998, with emeritus status thereafter.

Goldberger was first known for his applied econometric work with Lawrence Klein, his mentor at Michigan, developing an early macroeconometric model of the United States. This work led to a 1955 book coauthored with Klein and to a

1959 book based on his dissertation. However, after graduate school his attention turned toward microeconometrics and that remained his focus throughout his subsequent career.

Goldberger's ability to see through the technicalities of econometrics to illuminate core issues became apparent early on. His 1964 textbook *Econometric Theory* was a landmark that strongly influenced a generation of econometricians in the United States and then overseas in its several translations. The book was particularly notable for its introduction of latent variable models to a wide audience. His 1960s book *Functional Form and Utility: A Review of Consumer Demand Theory* was an "underground classic" that circulated in manuscript for many years before it was finally published in 1987. His 1968 book *Topics in Regression Analysis* introduced the now-ubiquitous terms "mean independence" and "analogy principle." Defining the latter, he wrote (p. 4): "the analogy principle of estimation ... proposes that population parameters be estimated by sample statistics which have the same property in the sample as the parameters do in the population."

In the early 1970s, Goldberger achieved a beautifully clear synthesis of structural equations models in econometrics, path analysis in sociology, and factor analysis in psychology. This synthesis took shape in his 1972 *Econometrica* article "Structural Equations Methods in the Social Sciences," based on his Fisher-Schultz Lecture, in his 1973 book with Otis Dudley Duncan, *Structural Equations Models in the Social Sciences,* and in articles published in the psychological and statistics literatures. Through his program of research, Goldberger impressed on all of the social sciences the common mathematical foundations of approaches to data analysis that had previously been thought of as distinct or at most loosely related.

At the same time, he made important contributions to econometrics through his advocacy of minimum distance estimation as a general approach to the estimation of structural equations models. An example is his 1971 *Econometrica* article with Ingram Olkin, which showed the numerical equivalence of maximum likelihood and minimum distance estimation for a single structural equation in a linear simultaneous equation model.

In the latter part of the 1970s, stimulated jointly by scientific and ethical concerns, Goldberger focused his attention on the methodological underpinnings of the then-raging debate about the role of genetics and environment in determining human IQ outcomes. He found that commonplace assertions about the relative magnitude of genetic and environmental contributions to the population variance in IQ scores were based on misunderstanding of the latent variable models conventionally used to interpret statistical correlations between familial relationships and IQ. He argued cogently that many writers on IQ were improperly drawing the policy conclusion that educational and other social interventions cannot materially affect human outcomes. His 1979 *Economica* article "Heritability" provided an especially clear discussion of these matters. See also Gary Chamberlain's appreciation of this part of Goldberger's opus in Gary's article "Arthur S. Goldberger and Latent Variables in Econometrics" (*Journal of Economic Perspectives*, 1990),

published on the occasion of Goldberger's receipt of the AEA Distinguished Fellow award.

During the 1970s and 1980s, Goldberger made several contributions to the emerging econometric literature on selection bias, including "Linear Regression after Selection" (*Journal of Econometrics,* 1981). Also in the 1980s, Goldberger weighed in on the debate about the measurement of discrimination in labor markets. His work comparing the assumptions underlying the competing "direct regression" and "reverse regression" approaches did much to demystify the subject. See his "Reverse Regression and Salary Discrimination" (*Journal of Human Resources*, 1984).

In 1991, Goldberger published his highly successful Ph.D. econometrics textbook, *A Course in Econometrics*, followed by his 1998 undergraduate text *Introductory Econometrics*. These texts codified the exceptionally coherent and focused approach to the teaching of econometrics that Goldberger developed in his almost forty years of teaching at Wisconsin. The first part of *A Course in Econometrics* is justly celebrated for its transparent nonparametric exposition of linear least squares estimation as an application of the analogy principle to the population problem of best linear prediction under square loss. The second, more classical part of the book has become iconic for its brilliantly funny discussion of the concept of "micronumerosity," which Goldberger introduced as follows (pp. 248–249):

> Econometrics texts devote many pages to the problem of multicollinearity in multiple regression, but they say little about the closely analogous problem of small sample size in estimating a univariate mean. Perhaps that imbalance is attributable to the lack of an exotic polysyllabic name for "small sample size." If so, we can remove that impediment by introducing the term *micronumerosity*.

The written words cannot, however, fully capture the privilege that generations of Wisconsin Ph.D. students felt for having the opportunity to learn directly from Goldberger in class. His mastery as a teacher was legendary.

For readers who were not Wisconsin students or otherwise did not know Goldberger personally, perhaps the most revealing introduction to the econometrician and the man was published in this journal twenty years ago. This is his wonderful 1989 ET interview, with Nick Kiefer as interviewer. The interview is highly informative about the history of econometrics. Moreover, with Art speaking in a relaxed manner with Nick, this piece shows well the utter seriousness and devastating wit that combined to make him a remarkable human being.

Charles F. Manski
Department of Economics and
Institute for Policy Research,
Northwestern University
December 2009