

OBITUARY



Clive W.J. Granger

Professor Sir Clive William John Granger, Kt, Professor Emeritus at the University of California, San Diego, died on May 27, 2009. He was born on September 4, 1934.

Clive Granger was an influential thinker and a creative scholar whose work massively impacted econometric practice. His research helped to define modern time series econometrics and has been central to the subject's main developments over the last half century. He is personally responsible for some of the most exciting ideas that have emerged over this time. A measure of his influence is that empirical studies of economic time series cannot now be undertaken without using at least some of his methods or ideas. His formulation of the concept of cointegration with Robert F. Engle, with whom he was awarded *The Sveriges Riksbank Prize in Economic Science in Memory of Alfred Nobel* in October 2003, is universally acknowledged as fundamental. The idea and the vast methodology that has developed to implement it have profoundly changed the theory and the practice of econometrics and revitalized many of its links with economic theory. No analysis of nonstationary data can ignore the concept, and its practical impact extends well beyond economics through the social and business sciences, affecting political science, sociology, and marketing, and penetrating the natural sciences as far as paleobiology and paleoclimatology.

The huge impact Clive Granger has had on econometrics is reflected in more than 40,000 citations to his work, including more than 10,000 citations to the cointegration publication, six other publications having more than 1,000 citations each (covering causality, spurious regressions, forecasting, long-memory, and nonlinearity); and his papers on aggregation, semiparametric estimation, and spectral analysis each having many hundred citations—a truly unparalleled range of major contributions. Four defining characteristics of Granger's work are its originality, its concern for empirical relevance, its accessibility, and its cross-fertilization across a wide range of topics that extend from river flow, through psychopathic behavior and prices, to deforestation. In his own words (Granger, 2003):

I'm always hoping to make my research practical and useful. It starts out as theory but then one aims to move toward the practical end of things.

Clive Granger was born in Swansea, Wales, but left as a baby, moving first to Lincoln and subsequently to Cambridge, where he attended a local primary school and did well in mathematics. At 11, he was accepted by the Cambridge-shire High School for Boys, but in 1946, when his father returned from the war and his job took him to Nottingham, Clive moved to West Bridgford Grammar School. With support from enthusiastic mathematics teachers, and the happenstance of the University of Nottingham starting a new degree in Mathematics and Economics, Clive was accepted for that programme and graduated with First Class Honours in 1955, followed by a Ph.D. in 1959 on "Testing for Non-stationarity," a topic that was to define much of his later research.

Following a year at Princeton University, which led to his first book *Spectral Analysis of Economic Time Series* (with Michio Hatanaka), Clive returned to Nottingham as Reader and then Professor, before moving to the University of California at San Diego in 1974, where he remained for the rest of his career, attracting Robert Engle as a colleague in 1975. He was elected to a Fellowship of the Econometric Society in 1972, became a distinguished fellow of the American Economics Association and a Corresponding Fellow of the British Academy, received Honorary Degrees from Nottingham, Carlos III, Stockholm School of Economics, Loughborough, and Aarhus, had a building (at Nottingham University) named for him during his life, and joined Bertrand Russell (Literature, 1950) as a Nobel Laureate listed among the 100 Welsh Heroes.

Beginning with a number of studies outside of economics, Clive progressed to spectral analysis, studying shape characteristics typical for economic data and cross spectral dependencies in a major work with Michio Hatanaka. He moved on to analyze causality (via an operational concept of predictability that was testable from the joint distributions of observables) and then forecasting (with Paul Newbold), both endeavors attracting much attention and remaining highly pertinent. In celebrated further research with Paul Newbold, Clive criticized nonsense regressions, reawakening among economists concerns raised half a century earlier

by the British statistician Udney Yule. The Granger-Newbold work was part of a more general critique of empirical econometric studies that had failed to take account of the time-series properties of the data under analysis. Incursions into non-linear then long-memory models also opened new areas, which have seen huge advances since, especially as his bilinear model was a precursor to Rob Engle's autoregressive conditional heteroskedasticity (ARCH) process. Throughout, unit root nonstationarity remained a focus, partly from Clive's interest in financial economics, culminating in his development of cointegration based on the notion of common stochastic trends. This work demonstrated that if there are fewer equilibrium correction feedbacks than variables, the process cannot be stationary, thereby providing an endogenous explanation for the prevalence of unit roots in economic time series and helping to unify economic theory-based equilibrium relationships with dynamic econometric models. The resulting explosion of research reflects the timeliness and relevance of this key idea.

At the heart of Clive Granger's success lay a genius for creating simple mathematics for econometric modeling methods that, in one example after another, ended up impacting empirical research in unexpectedly important ways. His work demonstrated the importance of keeping ideas paramount while acknowledging the vital role of econometric technique in delivering practical solutions. As the first author concluded in "The Nobel Memorial Prize for Clive W. J. Granger" (Hendry, 2004):

His key publications have combined to implement Granger's long-term research agenda of improving the quality of econometric model building by a better match with the empirical evidence. It can be argued that this is one of the more successful research programmes in the history of econometrics, and will be a lasting contribution to our discipline.

The second author opened his 1997 *Econometric Theory* Interview (Phillips, 1997) with a similar sentiment:

Since the 1960s, Clive Granger has been one of our most influential scholars in time series econometrics. His writings encompass all of the major developments of the last 30 years. . . . The explosion of interest in cointegration is alone a striking testimony to the effect that his ideas have had on our discipline. To have had repeated instances of such extraordinarily influential research is surely testimony to Clive Granger's special talent as a researcher and writer.

Clive was an avid conference and seminar presenter, and supervised a large number of successful doctoral students. He was always ready to discuss the ideas of others constructively, and carried his distinction in an unassuming manner. He was a longstanding supporter of *Econometric Theory* and served as an Advisory Editor of the journal since its inception and chair of the Koopmans Prize

selection committee. His endearing *Nobel Prize* autobiography (Granger, 2003) reflects his genuine kindness and humility, detailing his career as a sequence of ten lucky breaks, thereby affirming Louis Pasteur's famous adage that "chance favors the prepared mind." Clive Granger was loved by his students, colleagues, and coauthors; he was admired by economists and statisticians as well as econometricians; and he will be dearly missed by all of us.

Clive married Patricia Loveland in 1960, and is survived by her, their son and daughter Mark and Claire, and a grandson Luke.

David F. Hendry and Peter C.B. Phillips
June 1, 2009

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