Engle and Granger Receive Nobel Prize in Economic Sciences

On October 8, 2003, the Royal Swedish Academy of Sciences announced that the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel, 2003, would be shared by Robert F. Engle "for methods of analyzing economic time series with time-varying volatility (ARCH)" and Clive W. J. Granger "for methods of analyzing economic time series with common trends (cointegration)." The two will share the prize amount of 10 million Swedish kroner (about US$1.3 million).

Researchers use data in the form of time series, i.e., chronological sequences of observations, when estimating relationships and testing hypotheses from economic theory. Such time series show the development of GDP [gross domestic product], prices, interest rates, stock prices, etc. During the 1980s, the 2003 laureates devised new statistical methods for dealing with two key properties of many economic time series: time-varying volatility and nonstationarity.

On financial markets, random fluctuations over time—volatility—are particularly significant because the value of shares, options, and other financial instruments depends on their risk. Fluctuations can vary considerably over time; turbulent periods with large fluctuations are followed by calmer periods with small fluctuations. Despite such time-varying volatility, in want of a better alternative, researchers used to work with statistical methods that presuppose constant volatility. Robert Engle's discovery was therefore a major breakthrough. He found that the concept of autoregressive conditional heteroskedasticity (ARCH) accurately captures the properties of many time series and developed methods for statistical modeling of time-varying volatility. His ARCH models have become indispensable tools, not only for researchers, but also for analysts on financial markets, who use them in asset pricing and in evaluating portfolio risk.

Most macroeconomic time series follow a stochastic trend, so that a temporary disturbance in, say, GDP, has a long-lasting effect. These time series are called nonstationary; they differ from stationary series, which do not grow over time but fluctuate around a given value. Clive Granger demonstrated that the statistical methods used for stationary time series could yield wholly misleading results when applied to the analysis of nonstationary data. His significant discovery was that specific combinations of nonstationary time series may exhibit stationarity, thereby allowing for correct statistical inference. Granger called this phenomenon cointegration. He developed methods that have become invaluable in systems where short-run dynamics are affected by large random disturbances and long-run dynamics are restricted by economic equilibrium relationships. Examples include the relations between wealth and consumption, exchange rates and price levels, and short- and long-term interest rates.

Robert F. Engle was born in 1942 in Syracuse, New York. He received his Ph.D. from Cornell University in 1969 and is currently the Michael Armellino Professor of Management of Financial Services at New York University.

Clive W. J. Granger was born in 1934 in Swansea, Wales. He received his Ph.D. from the University of Nottingham in 1959 and is an emeritus professor of economics at the University of California, San Diego.

—From news announcements of the Royal Swedish Academy of Sciences