Robert E. Lucas, Jr.

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Robert E. Lucas, Jr. (September 15, 1937 – May 15, 2023) made vital contributions to economic theory and econometrics. He formulated and applied a class of equilibrium Markov models models suitable for analyzing the types of macroeconomic policy interventions that Koopmans, Marschak, Hurwicz and other creators of econometric methods appropriate for systems of stochastic difference equations wanted to assess quantitatively. An equilibrium Markov model is a collection of decision makers, associated Markov decision problems defined over a common state space, and budget and resource constraints that bind decision makers' MDP's together.

In equilibrium Markov models, parameters of the dynamic demand and supply curves that the best Keynesian macroeconometric models had assumed to be invariant to interventions are instead functions of parameters that an historically unprecedented policy intervention would alter. An equilibrium Markov model pins down functions that describe those alterations. That makes it possible to analyze consequences of historically unprecedented policies.

A rational expectations assumption imposed in equilibrium Markov models economizes on free parameters by making all decision makers inside the model share a vector stochastic process with each other and with the theorist who built the model. Decision makers use that stochastic process to form the conditional distributions that appear in Euler equations that restrict their decision rules. Rational expectations econometrics extends that communism of statistical models to include a "sharing with nature" that is an essential input into making maximum likelihood or generalized method of moments be good estimators.

Lucas applied equilibrium Markov models to monetary economics, macro-labor, macro-finance, international finance, business cycle theory, growth theory, social insurance, and industrial organization. For example, in the 1970s he constructed equilibrium Markov models that reconcile real and monetary theories of business cycles. In the 1980s, he used his model of "asset prices in an exchange economy" to calculate an upper bound on social welfare benefits that could come from further improvements in US countercyclical macroeconomic policies. Those benefits were small, prompting Lucas to redirect his work in macroeconomics toward growth theory and social insurance arrangements in the presence of information and enforcement difficulties.

Lucas agreed with Nicolaus Copernicus and Stephen Weinberg that " ... a

simple and beautiful theory that agrees well with observation is often closer to the truth than a complicated ugly theory that agrees better with observation." Lucas recognized how that prejudice raises difficulties with the foundations of the rational expectations econometrics that he had pioneered in the 1970s. He left it for future researchers to understand how to do quantitative policy analysis when armed only with misspecified models.