

IN MEMORIAM : Roy RADNER

Roy Radner, former President of the Econometric Society in 1972-73, passed away on October 6, 2022, in Newton, Pennsylvania, at the age of 95. He was Leonard N. Stern School Professor of Business Emeritus at New York University. We miss one of the greatest economic theorists of our times.

Roy Radner grew up in Chicago, Illinois, where he was born on June 29, 1927 in a modest family of eastern European immigrants. After his military service in the U.S. Army in 1945-48, he got from the University of Chicago a B.S. in Mathematics (1950), then a M.S. in Mathematics (1951), followed by a Ph.D. in Mathematical Statistics (1956) under the supervision of Leonard Savage. During his graduate studies, he was affiliated with the Cowles Foundation, then located in Chicago, before joining the Department of Economics at Yale University as assistant professor when the Cowles Foundation moved there (1955-57). Roy Radner had next a distinguished career at the Department of Economics of the University of California at Berkeley (1957-77), which he chaired in 1966-69. He made me then the honour of agreeing to be on my Ph.D. Committee, together with Gerard Debreu, my adviser, and David Gale (1970). After an affiliation with Harvard University (1977-79), he joined the Technical Staff at Bell Laboratories (1979-95) (named « Distinguished Member » from 1985 on). Roy Radner had been affiliated with the Department of Economics at New York University since 1983, and moved there as Leonard Stern School Professor of Business in 1996.

Roy Radner was gifted with outstanding analytical abilities and a great curiosity, that enabled him to make remarkably innovative contributions on a wide range of economic issues. Early contributions involved in particular analyzing the structure of optimal long term growth programs in von Neumann capital accumulation multisector models. Which led in particular to a “Turnpike theorem” (1961) hailed by Paul Samuelson along with quite a few other giants of economic theory. Also, with the influence of Jacob Marshak, Roy Radner’s early contributions opened new fruitful research avenues by introducing an innovative *theory of teams*, that generated significant progress in the analysis of decision processes and of management in firms and industrial organizations.

His seminal introduction of the notion of “Equilibrium of Plans, Prices and Price Expectations in a Sequence of Markets”, known as a *Radner equilibrium* (*Econometrica*, 1972), changed fundamentally the tools with which economists were able to analyze uncertainty and dynamic interactions in general equilibrium models. Until then, the dominant paradigm was the Arrow-Debreu-McKenzie model of uncertainty, which assumed “complete markets”. That model was essentially static, as all transactions and the corresponding prices were all determined at the initial date, through current complete spot and future contingent markets for the delivery of commodities in the current period as well as for all future dates and all (uncertain) events. The innovation of Roy Radner was to reintroduce reality through the existence of a sequence of markets at every date and event (of “temporary equilibria”, in the spirit of Hicks’ *Value and Capital*), hence the necessity to model accordingly the agents’ decisions at each date as resulting in particular from their expectations about the future. The seminal contribution was essentially to introduce the notion of equilibrium of “price expectations”, that is in effect of a *rational expectations equilibrium*.

Roy Radner's pioneering work on the existence and properties of dynamic equilibria, including expectations, changed the tools with which economists were able to analyze uncertainty, dynamic interactions in general equilibrium models, financial markets, as well as in dynamic strategic games under conflict, partnership or teams. Subsequent contributions, in particular by Roy Radner and his coauthors, generated significant progress in our understanding of the consequences of incomplete markets, the role of prices in conveying information in rational expectations equilibria, the impact of differences in the information available to the agents, among others. All this not only within the framework of sequential markets for commodities and for financial assets, but also in repeated dynamic games involving incomplete and asymmetric information, moral hazard, adverse selection, so as to improve actual decision processes in firms' management, bargaining, industrial organizations.

Roy Radner's curiosity led him indeed, as documented above, to investigate new areas beyond the mainstream paradigms. He got interested in particular early on by issues involving bounded rationality, by exploring the consequences of weakening the notion of "maximizing" into "satisficing" in decision making (*JMathEcon*, 1975). He was convinced that a "precise definition of bounded rationality" was needed, and still to be found. But he kept exploring a large number of issues involving less than full rationality in dynamic markets and games. To name only a few: the consequences of sticky buying habits in demand formation, the impact of corruption that undermines investment in some developing countries and how to regulate it. Roy Radner was also much interested in, and contributed significantly to, the economics of the "Industry of Higher Education", the valuation of information goods and its possible contribution to the theory of firms' management, and the statistical theory of data mining.

By the mid-1990s, Roy Radner got deeply concerned with, and focused his efforts primarily on, issues involving climate change, sustainable development and the survival of the human species. He contributed significantly to the ongoing debate by employing dynamic equilibrium models in which the evolution of greenhouse gases was modeled as long lived in agreement with the scientific evidence, and by proceeding to a thorough game theoretic analysis of the incentive compatibility, self-enforcing properties, of climate change, global warming treaties among nations. As a testimony of his contributions in the area, Roy Radner received in 2007 the additional title of Professor of Environmental Studies at New York University.

Roy Radner's contributions were recognized widely with many honours both at home and abroad. He was twice the recipient of a Guggenheim Fellowship (1961-62, 1965-66), was elected fellow of the Econometric Society in 1962 and its President in 1972-73, a fellow of the American Academy of Arts and Sciences (1970), and a member of the National Academy of Sciences (1975). He was elected a Distinguished Fellow of the American Economic Association (1988), a fellow of the American Association for the Advancement of Science (1989), a fellow of the Society for the Advancement of Economic Theory (SAET, 2011). He was Overseas Fellow of Churchill College at Cambridge, UK, in 1969-70, and gave the Marshall Lectures there in 1989-90. He got the Woytinsky Award from the University of Michigan at Ann Arbor in 1998.

Roy Radner was a friendly person and made these prolific groundbreaking contributions often with younger colleagues so as to encourage them. According to the words of his children on his Memorial on the UC Berkeley website:

“Throughout the course of his life, Roy was a loving father, devoted spouse, and generous to colleagues, students, and friends ... He leaves behind his wife, Charlotte Kuh, three children (Hilary Radner, Ami Radunskaya and Ephraim Radner), two step-children (Siobhan Stiglitz Florek and Michael Stiglitz), three grandchildren (Ezra, Hannah and Isaac) and a great-grandson Callahan”.

We miss a great economic theorist and a great person.

Jean-Michel Grandmont

Former President, Econometric Society, 1990

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