

In Memoriam: Franklin M. Fisher

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Franklin M. Fisher passed away on April 29, 2019 at the age of 84. Fisher was one of the most versatile and accomplished economists of his generation. He made important contributions to economic theory, to the design and application of econometric tools, to the study of firm behavior, and to the application of economic analysis in competition policy.

Fisher was a star undergraduate at Harvard College, where he was mentored by industrial organization economist Carl Kaysen. After graduating *summa cum laude* in 1956, he remained at Harvard for graduate school, earning his Ph.D. three years later under the supervision of John Meyer. As a graduate student, he was elected to a junior fellowship in Harvard's Society of Fellows, thereby securing relief from teaching responsibilities. Fisher spent one year at the University of Chicago as an assistant professor after completing his Ph.D., then returned to Cambridge, where he joined the faculty at the Massachusetts Institute of Technology (MIT). He remained at MIT for the rest of his career. At the time of his death, he was the Dennis and Jane Berkowitz Carlton Professor of Applied Economics, emeritus.

Fisher played an important role in graduate education at MIT. He supervised more than sixty doctoral dissertations. His dry wit and love of stories, particularly funny ones, made him a beloved teacher and advisor. He introduced hundreds of MIT graduate students to both microeconomic theory and econometrics, often delivering without notes technical lectures that were interspersed with references to literature and performing arts.

Fisher's scientific contributions ranged widely. In economic theory, he made important advances in the theory of aggregation, focusing in particular on the conditions under which it was possible to construct a meaningful aggregate capital stock or to combine the production functions for different firms to construct an aggregate production function. In related research, he studied the measurement of technological change when such change is embodied in heterogeneous capital goods. These issues were summarized in his Fischer-Schultz Lecture, presented at the 1968 European meetings of the Econometric Society. Fisher's findings on aggregation were a significant contribution to the Cambridge-vs.-Cambridge capital theory debates of the 1960s.

Fisher recognized that insights about the aggregation of quantities, such as output or capital stocks, also had important implications for the aggregation of prices when constructing price indices. In joint research with Karl Shell, Fisher developed the theory of price index construction in the presence of time-varying consumer tastes, technological change, and product quality. This research was summarized in their 1972 book, *The Economic Theory of Price Indices*.

Fisher also carried out a research program on stability and equilibrium dynamics, arguing that one of the most important questions in economics was how economic systems adjusted when out of equilibrium. He studied how the degree to which economic agents perceive arbitrage opportunities that are created by markets that are out of equilibrium determines disequilibrium dynamics, and concluded that there was no guarantee that an out-of-equilibrium economy would converge to a Walrasian equilibrium. Fisher's major findings were published in his 1983 treatise, *Disequilibrium Foundations of Equilibrium Economics*.

In econometrics, Fisher's theoretical research focused on identification in simultaneous equation models. He studied identification in block-recursive systems, explored questions of causal inference in multi-equation models, and analyzed how specification errors affected various estimators, particularly the family of k-class estimators. His 1966 classic, *The Identification Problem in Econometrics*, provided a systematic review of the conditions under which specific parameters in systems of

simultaneous equations were identified. A distinct econometric contribution, a 1970 expository note on testing equality of coefficients in two linear regressions found wide application in applied econometrics.

Fisher was also a wide-ranging applied economist who built and estimated models of firm or consumer behavior, typically in a particular industry. Often in collaboration with co-authors, he studied the demand for aluminum, for copper, and for electricity, and he examined the market impact of annual model changes in the automobile industry. Fisher's curiosity about the details of market structures, coupled with his broad command of economic theory and econometrics, enabled him to identify key features of market performance in many settings, and they also drew him to the study of competition policy and antitrust.

Fisher focused much of his attention in the later stages of his career on issues in antitrust analysis. He served as an economic expert in the two most significant monopolization cases of the last 50 years. In the 1970s, he was the lead economic expert for IBM in its defense against the Justice Department's antitrust case, which was brought under Section 2 of the Sherman Act. After 12 years of litigation, in 1982 the Justice Department abandoned the case as "without merit." While this outcome validated Fisher's conclusions about the substance of the case, it denied him the opportunity to testify in court and to display his broad command of the computer industry. In *Folded, Spindled, and Mutilated*, a 1983 monograph with John McGowan and Joen Greenwood, Fisher recounted the economic arguments that were developed in this landmark case. These included the challenge of equating accounting rates of return to their counterparts in economic theory, an insight that he and McGowan developed in a widely-cited *American Economic Review* paper.

In the early 1990s, Fisher served as the government's lead expert witness in the Department of Justice's suit against Microsoft. The case focused to a large extent on Microsoft's bundling of its internet browser and Windows operating system, seemingly offering a parallel to the government's claim in the earlier IBM case that IBM had engaged in anticompetitive bundling. Focusing on the specific industry setting and factual record, a point that he often stressed as crucial in approaching antitrust analysis, Fisher argued that Microsoft's behavior, unlike IBM's, constituted anticompetitive monopolization. After a highly publicized trial, the Department of Justice prevailed. Fisher's work as an expert witness in this case and others was a central motivation for a number of articles he wrote reflecting on the contributions and limitations of oligopoly theory as a guide for public policy.

Fisher had a long-term interest in the geopolitics of the Middle East, and in the early 1990s, he launched a major project on the economics of water resources in the Middle East. The project involved building a "water model" for the region, recognizing the cost of generating water from backstop technologies such as desalination, as well as the gains from trade between nations. A key finding was that the value of the water resources that nations might acquire through military action was surprisingly small – unlikely to justify the risks and potential losses of such action.

Fisher was actively involved in the Econometric Society, serving as President in 1979 and as the editor of *Econometrica* from 1968 until 1977. He received the John Bates Clark Medal from the American Economic Association in 1973. The citation associated with that award explained that "in his empirical work, [Fisher] has lived up to the high standards he set for himself in his methodological contributions. His work represents one of the finest examples of the interaction of theory and measurement in economics." In 2001, Fisher received an honorary doctorate from the Hebrew University, a recognition that was particularly meaningful in light of his long-standing dedication to developing the scholarly community in Israel.

The insight, wit, and analytical power that Fisher brought to economics will be sorely missed.