

ET OBITUARY



Phoebus J. Dhrymes (1932–2016)

Phoebus James Dhrymes was born in Ktima, Cyprus on October 1, 1932 and died on April 8, 2016 in New York. His surname derives from the place of his ancestry, “Dhrymou”, a small village in the Paphos district only a few miles from Ktima. His life journey took Phoebus from these humble village-boy beginnings to the Edwin W. Rickert Professorship of Economics at Columbia University. The journey is a striking story of diligence and perseverance, driven by a desire to learn, to self-educate, and to teach in the classroom and through a sustained body of elementary and advanced texts in econometrics. Phoebus sprinkled this life journey with what might seem as inadvertent decisions, such as volunteering to be drafted into the US Army in 1952, but throughout he maintained a single-mindedness to succeed and to be guided by the honorable virtues of his Greek heritage: fairness (*δικαιοσύνη*), temperance (*σωφροσύνη*), fortitude (*ανδρεία*), and wisdom (*φρόνηση*). These virtues fostered his insatiable thirst for knowledge, his passion for teaching, and his life-time devotion to family.

In reality, there was nothing inadvertent in any of Phoebus’s life choices, including his volunteering to be drafted into the US army only a few months after arriving in the US. Having no source of money, that choice was his only feasible path to a university education thanks to the GI Bill (The Servicemen’s Readjustment Act of 1944). To take full advantage of the GI Bill’s allowance of \$110 for 36 months after his two years of military service, he enrolled at the University of Texas at Austin in 1954 and completed his undergraduate degree in Economics within 30 months by 1957. He could not afford to go to the University

of California, Berkeley, or New York University, despite receiving offers because his monthly allowance would not cover his living expenses in San Francisco or New York City.

Based on his outstanding performance as an undergraduate at the University of Texas (Austin), he managed to secure a Woodrow Wilson Fellowship to study for his Ph.D. After seeking advice from his professors, he decided not to apply to what they perceived to be the most esteemed universities at the time such as Harvard or Yale. But he did apply and was admitted to the Massachusetts Institute of Technology (MIT), where he earned his Ph.D. in 1961 under the supervision of Edwin Kuh and Robert Solow.

Phoebus's first encounter with econometrics, the field that became his academic calling, occurred during his graduate studies at MIT. But he was completely unprepared for it, having virtually no mathematics background beyond simple algebra. His undergraduate degree included no serious mathematics. According to Phoebus

“people in the University of Texas at the time discouraged the use of mathematics; they thought people who used mathematics in economics really did not know economics and were merely hiding their ignorance behind mathematical symbols. That was a universal view in that department at the time.” (Spanos, 2002, p. 1226)

The first course in econometrics he attended at MIT was given by Robert Strotz of Northwestern University on “Simultaneous Equations”, and his second exposure to econometric ideas was through a series of lectures by Henri Theil at Harvard during the academic year 1960–1961. Despite his immediate enthusiasm for econometrics, young Phoebus understood little from attending these lectures and became painfully aware of his poor technical background in mathematics and statistics. This poignant realization had a lasting effect on his future endeavors in learning, research and teaching. He resolved to figure it all out for himself and to help others do the same through his teaching and publications. He viewed his weak technical background as a challenge and he was determined, one way or another, to acquire the expertise to decipher the econometric techniques he could not properly understand at the time.

The endeavor began with the hard road of a minor in mathematics during his studies at MIT with a view to learning probability theory, matrix algebra, and mathematical analysis. He seconded that by turning down an opportunity to spend his one year NATO fellowship at the *Econometric Institute*, at the Netherlands School of Economics in Rotterdam to work with Henri Theil. Instead, he opted to spend the time at Stanford to enhance his technical background by attending courses in mathematical analysis and multivariate analysis. The latter course, taught by Ingram Olkin, was an eye-opener for Phoebus.

By a curious twist of fate Phoebus began his academic career in 1962 as an Assistant Professor at Harvard, one of the universities he eschewed for graduate studies as being too prestigious and beyond his reach as a student. Still risk averse

by nature, he later had no hesitation accepting a tenured Associate Professor position at the University of Pennsylvania in 1963 and was duly promoted to full Professor four years later. Nostalgic for the topography, climate and vegetation of Cyprus, Phoebus considered making Southern California his home by spending two years at UCLA. But now, with young children in a growing family, he decided against it and accepted instead a professorship at Columbia University in 1973, where he stayed until his retirement in 2013.

Phoebus's early research focused primarily on applied econometrics pertaining to production, investment, labor, and financial markets. His Ph.D. thesis had built an econometric framework with explicit functional forms and stochastic error terms for the Solow growth model based on a neoclassical production function with capital, labor, and 'time' (technology) inputs. This formulation enabled him to secure optimal estimates for key parameters of interest and to conduct tests of certain hypotheses such as comparing productivity in the manufacturing and service industries (Dhrymes, 1962a, 1962b, 1963). In financial market research, a particularly influential study was his joint work with I. Friend and N. B. Gultekin on the arbitrage pricing theory (APT), published in 1984–1985. This work called into question the empirical underpinnings of the APT, including the misuse of principal component analysis. While retaining a longstanding interest in applied work, Phoebus found his main calling to be in methodology and technical issues, publishing innovative findings on simultaneous equations and time series modeling and inference (e.g., Dhrymes, 1969; 1973a, 1973b; 1994a, 1994b; 1997).

Throughout his long career, Phoebus continued to sharpen his technical understanding by working doggedly through every derivation in his lectures in econometrics. His aim was to shed light on all the technical details needed to comprehend and use the results. His ultimate goal was to filter, distill, and synthesize the contributions of the leading researchers in econometrics into a coherent and illuminating framework for others to follow. As he put it himself:

“As I looked at the development of econometrics in the 1970s and early 1980s, I became more and more convinced that the probability and statistics tools available to the average econometrician were not up to the task for a deep understanding of the developments, especially in time series, taking shape during those decades.” (Spanos, 2002, p. 1250)

His efforts resulted in several pathbreaking books. His first advanced textbook *Econometrics: Statistical Foundations and Applications* was published in 1970, accompanied by a distinctive green paperback edition that was affordable to students. This book exemplified his aspiration to provide a full discussion of the relevant principles of probability, statistics, and multivariate analysis that enabled a thorough textbook treatment of the simultaneous equations model (SEM), the cornerstone of econometric theory at that time. Only Malinvaud's (1966) treatise matched the Dhrymes text in terms of its mathematical and probabilistic rigor and attention to careful asymptotic theory.¹ With this book, Phoebus explained

to his own satisfaction the material in Chapter 6 of Hood and Koopmans (1953), with which he had struggled during the course taught by Strotz at MIT in 1959. Phoebus's text broke away from the popular treatments of Johnston (1963) and Goldberger (1964) through its attention to probabilistic foundations, its rigorous treatment of asymptotic procedures, and its discussion of spectral methods for time series data. Motivated by pedagogical concerns, Phoebus courageously departed from traditional SEM notation with the intent of enhancing a reader's understanding by closer links with classical linear model notation. His insistence on using his own notation may have been a bridge too far for most practitioners in econometrics, restricting the potential impact of his approach at that time but foreshadowing much later developments in notation.

Similar innovative features characterize Phoebus's next two books. Both are notable for their rigor and coherent discussion of econometric tools that stem from Phoebus's concern for unifying conceptualizations. The first book, *Distributed Lags: Problems of Formulation and Estimation*, appeared in 1971 at a time when these methods were highly popular in empirical work and there was little formal guidance for practitioners. The book was also an attempt to link the Box-Jenkins time series modeling perspective to econometrics using a variety of lag formulations motivated by economic theory. It also provided an early rigorous treatment of lag operator algebraic methods in econometrics.

The second book was a beginning text published in 1978 and entitled *Introductory Econometrics*. The book showcased Phoebus's ability to construct unifying formulations, elucidating similarities and differences among several statistical models related to linear regression by using a powerful matrix notation to highlight their common linear model thematic. Another example of this expositional skill was his innovative treatment of discrete choice models. In an inspiring testimonial to Phoebus's memory, John Guerard has volunteered to oversee the publication of a second edition of *Introductory Econometrics*, contributing enhanced empirical examples that add considerably to the value of the original edition.

Phoebus was acutely aware of the growing sophistication in econometric asymptotic theory from the 1980s onwards. This realization led him to a series of determined efforts to provide high level expositions of the new limit theory methodology and its measure theoretic foundations. He began with two companion textbooks on advanced econometrics entitled *Topics in Advanced Econometrics, Vol. I: Probabilistic Foundations* and *Topics in Advanced Econometrics, Vol. II: Linear and Nonlinear Simultaneous Equations* that were published in 1989 and 1994. In 1998 Phoebus published his last textbook, *Time Series, Unit Roots and Cointegration*, inspired by the insightful framework of unit root econometrics emerging in the 1980s that used powerful weak convergence methods in function space, changing econometric theory and practice forever to address random nonstationarity in economic data (Phillips, 1986, 1987a, 1987b, 1988; Johansen, 1988, 1995). This book opens a well-exposed pathway to the new methods and their many applications in econometrics for students and researchers.

Demonstrative of his extraordinary generosity and good spiritedness, Phoebus kindly cited in his dedication one of the present authors for this inspiration.

A careful reading of all his textbooks reveals the skill of a devoted scholar and a passionate teacher guided by clear pedagogical principles about how students may learn such technical material most effectively. In his own words:

“My books are not typical textbooks in the fashion of current econometrics literature. They do not contain, unrewritten, a bit from this paper, a bit from that paper, and so on. They try to develop a subject from beginning to end in a more or less unified manner; they take into account the literature, and if there are gaps in its development I fill them by ‘original’ research. Their objective is to teach the rudiments and refinements of the subject to someone who is interested but does not know much about it. In many ways, I write them first and foremost for myself. To explain to myself what the subject is all about.”
(Spanos, 2002, page 1260)

For much of his career Phoebus was actively engaged in journal editing, including being managing editor and editor of the *International Economic Review*, a member of the advisory board of *Econometric Theory*, and one of the founding editors of the *Journal of Econometrics*. A special issue to honor Phoebus was published by the *Journal of Econometrics* in 2010 and included articles by many of his academic friends and admirers, including the present authors. The issue was based on a conference that was held in June 2007 in Paphos (Cyprus) near his home town.

Throughout his working life, Phoebus possessed unconditional reverence for his Greek heritage and his country of origin. His first publication was written as an undergraduate student on the subject of the consequences of debt bondage in ancient Greece (Dhrymes and Polakoff, 1958). He would always volunteer to help Cyprus in any way he could. When the opportunity arose to help with the founding of the University of Cyprus during the period 1992–2000, he provided constant advice and willingly participated in the time-consuming business of selection committee deliberations. He was awarded an Honorary Doctorate by the University of Cyprus in 2002.

Phoebus Dhrymes was an outstanding scholar, an inspiring teacher, and a fine human being. He breathed new life into econometric education through his dedication to strong foundations, technical rigor, and economic relevance. His enthusiasm for econometrics as a discipline filled a large space around him, enchanting his students and all those who spent time with him. He lives on in our memories and in the legacy of his many writings.

Aris Spanos and Peter C.B. Phillips

NOTE

1. Malinvaud (1966), which was a translation of the original French edition published in 1964, provided a fully rigorous development of the asymptotic theory for multivariate nonlinear regression

and applied that theory to linear simultaneous equations model estimation and testing, allowing even for parameter nonlinearity in the specification (see Phillips, 2015a, 2015b, 2017).

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