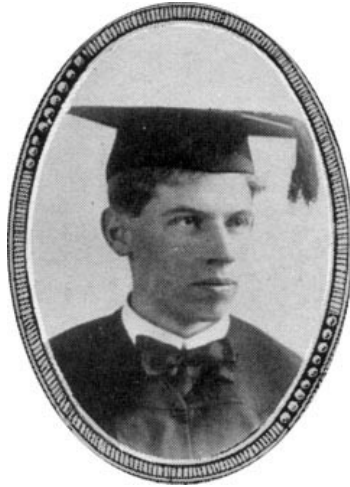


## A MEMOIR ON THE LIFE OF HAROLD THAYER DAVIS (1892–1974)\*

by

*RICHARD WILLIAM FAREBROTHER†*

*Victoria University of Manchester*



Harold Thayer Davis, 1916, from *The Nugget* Yearbook (by courtesy of the Colorado College Archives and Special Collections).

In this paper we give brief details of the life of Harold Thayer Davis (1892–1974) and outline his contributions to econometrics in its early years.

### 1 INTRODUCTION

Carl Christ's (1952) history of the first 20 years of the Cowles Commission opens with the following passage:

The Cowles Commission for Research in Economics was founded in 1932. Alfred Cowles, presidents of Cowles and Company, an invest-

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ment counselling firm in Colorado Springs, Colorado, initiated some inquiries into the accuracy of professional stock market forecasters over the period 1928–1932. This aroused his interest in fundamental economic research, which led him to offer his financial support toward the establishment of the Cowles Commission and to bear a significant share of the burden each year. Fortunately at the outset he encountered Harold T. Davis, a professor of mathematics at Indiana University whose interests included mathematical economics and statistics. Davis was to become an important figure in the founding of the Cowles Commission and in its progressive development through the years . . . .

And yet the name of Harold Thayer Davis is little known to present-day econometricians despite his many contributions to their subject in its early years. Indeed, it is unlikely that the author would have undertaken this study had he not been intrigued by the extensive citation of Davis's (1941a, 1941b) books in the text published by his Cowles Commission colleagues, Gerhard Tintner (1952) and Oskar Lange (1959).<sup>1</sup>

## 2 BIOGRAPHICAL DETAILS

Harold Thayer Davis was born in Beatrice, Nebraska, on 5 October 1892 and died in Bloomington, Indiana, on 14 November 1974. He was educated at Colorado College<sup>2</sup> (A.B. 1915, Hon. LL.D. 1949), Harvard College (A.M. 1919) and the University of Wisconsin (Ph.D. 1926). He was employed as an instructor in mathematics at the University of Wisconsin from 1920 to 1923, and then he was successively assistant professor, associate professor and full professor of mathematics at Indiana University from 1923 to 1937. After a brief one-semester stay as acting professor of econometrics<sup>3</sup> at Colorado College, he was appointed professor of mathematics at Northwestern University<sup>4</sup> in 1937, becoming Chairman of the Department in 1942, and retiring in 1955. Between 1961 and 1969 he was professor of mathematics at Trinity University and Chairman of the Department between 1963 and 1965.

While at Indiana University, Davis established the Principia Press,

<sup>1</sup>Tintner, Davis and Lange were the authors of Cowles Commission monographs 5, 6 and 8 respectively.

<sup>2</sup>Davis's wife, Agnes Holm and his sister, Marjorie Davis, were also graduates of Colorado College.

<sup>3</sup>Davis's predecessor at Colorado College was C. F. Roos who was the first director of the Cowles Commission and the author of monograph 1. See Davis's (1958) obituary of Roos for further information.

<sup>4</sup>T. W. Anderson and his sister were both students of Davis's at Northwestern University: see De Groot (1986) and Phillips (1986).

his purpose being to stimulate [the] publication of limited edition treatises. Later at Trinity University, he was likewise associated with enlargement of the Trinity Press. (Colorado College, 1974)

Davis was a prolific writer in many areas and a forthright advocate of the principles he believed in. On one occasion

[he] expressed a vigorous opinion on a subject widely removed from his primary field of knowledge which called forth a challenge, quoted in Latin<sup>5</sup> [from a member of his hiking group] . . . ‘ne sutor ultra crepidam’ (‘let the shoemaker stick to his last’). (Colorado College, 1974)

This jibe gave Davis the title for his autobiography, *The Adventures of an Ultra-Crepidarian* (1962).

The 468 page volume is filled with fascinating fragments of Dr Davis’ life, with penetrating insights in to areas which intrigued him . . . . It reflects the author’s warm human qualities, many amusing sidelights in his ever zestful life, his rich fertility of mind, his intense application to work and duty, and his abiding confidence in the ultimate victory of reason over ignorance and of good over evil. (Colorado College, 1974)

### 3 PUBLICATIONS

Davis’s publications list includes

some 60 volumes [of full length] . . . along with at least an equal number of treatises and dissertations of lesser size. His major writings range in content from a 20 volume ‘Encyclopaedia of Mathematical Functions and their Tables’ to one ‘On the Fine Art of Punning’, and a series of imaginative Christmas tales [published<sup>6</sup> as *The Spectral Santa Claus*] sent annually over a 20 year period to his wide circle of friends. Among other of his more serious works are ‘Philosophy of Modern Science’, ‘General Mathematics’, ‘Theory of Linear Operators’, ‘College Algebra’, ‘The Theory of Econometrics’, ‘The Analysis of Economic Time Series’.

<sup>5</sup>[Davis had been] dubbed “Caesar” by his high school associates (from his unusual interest and aptitude for Latin . . .), this nick-name persisted throughout his professional career . . .’ (Colorado College, 1974). Indeed, T. W. Anderson recalls this nick-name in his conversation with De Groot (1986, p. 97).

<sup>6</sup>The Book Editor of the *Colorado Springs Gazette* notes (8 December 1967) that ‘The stories are the kind with which academic friends may greet each other in their lighter communications.’

Other subjects among his wide-ranging writing interests include a two-volume work on the ancient city of Alexandria, growing out of mathematical foundations established there; also one on Cleopatra, perhaps deriving from the Alexandria book. One of his later fields of interest was research on possible causes of cancer, resulting in a new theory which he pursued to the time of his death. An avid billiard player, he was intrigued by the mathematical aspects of that pastime and from such research found interesting substantiations of the conclusions of the Italian economist and engineer Pareto, on the distribution of incomes . . . . (Colorado College, 1974)

#### 4 ECONOMETRICS

Of all the works listed in the last section, the two most likely to be of interest to readers of this journal are *The Analysis of Economic Time Series* (1941a) and *The Theory of Econometrics* (1941b). These books were written in parallel as Davis explains in his preface to the latter (1941b, pp. xii–xiii):

It soon became apparent to the author that some extensive co-ordination of the material on time series was necessary before the second part of the book could be completed satisfactorily. It was necessary, therefore, to interrupt the writing of the present volume [*The Theory of Econometrics*] and to prepare a second work on the subject of economic dynamics. This work, *The Analysis of Economic Time Series*, is now completed . . . . The author has borrowed heavily from the material in this treatise. Much of the analysis and many of the charts have been reproduced in the present work. Since *The Analysis of Economic Time Series*, however, was written as a treatise, and the present volume as a text, the material in the latter has been treated less completely . . . .

Thus, *The Analysis of Economic Time Series* (1941a) was a treatise on time series analysis covering such topics as harmonic analysis, serial correlation analysis, the analysis of trends, and periodogram analysis, whilst *The Theory of Econometrics* (1941b) was an unusual blend of mathematical economics, statistical economics, economic statistics, actuarial mathematics,<sup>7</sup> and time series analysis. This blend would not now be accepted as the subject matter of econometrics but Davis (1941b, p. xi) had a clear view of what he understood by the term:

<sup>7</sup>Seven tables are printed at the end of Davis's *The Theory of Econometrics* (1941b, pp. 465–471). Six of these tables are actuarial in nature; the seventh tabulates values of  $1/(2p + 1)$  and  $3/[p(p + 1)(2p + 1)]$  to aid the fitting of linear trends.

Since the newly-coined term ‘econometrics’ connotes better than either ‘mathematical economics’ or ‘statistical economics’ the measure of [Davis’s] task, this word has been adopted as a descriptive title. As one may infer, it implies that the phenomena of economics are to be investigated through their statistics, and such patterns as may be observed are to be described in mathematical terms and by means of mathematical equations. Although this may remove the book from the reach of some who do not know the language of mathematics, there seems to be no other way in which so large an area can be exactly surveyed.

## 5 ESTIMATION

Both of the books discussed in Section 4 were written at a high mathematical level and assumed a sound knowledge of elementary statistics.<sup>8</sup> But Davis (1941a, pp. 247–271 and 394–418; 1941b, pp. 23–50 and 215–239) made no use of statistical principles when fitting the Pareto model<sup>9</sup>

$$y = ax^{-V}$$

to data on the number of persons  $y$  with income in excess of amount  $x$ , or when fitting the logistic model

$$y = k/(1 + be^{at})$$

to the size  $y$  of a population at time  $t$ . Instead he adopted the traditional curve-fitting approach. This approach was standard in economic statistics until the mid-1960s (see Croxton and Cowden, 1939, 1955, or Mills, 1938, 1965), but it was eliminated from mainstream econometrics by the probabilistics revolution<sup>10</sup> initiated by Haavelmo (1944) and completed by Hood and Koopmans (1953).

The traditional approach was characterized by a lack of concern for the statistical properties of the economic variables being studied, and thus by the use of arbitrary estimation procedures (see Farebrother, 1987, 1998), whereas the new approach stressed the probabilistic foundations of the model and recommended the use of maximum likelihood estimation procedures.

<sup>8</sup>For example Davis (1941b, pp. 26, 399) assumes that the reader is familiar with the moments of a distribution and Pearson’s measures of skewness and kurtosis. Both texts contain several references to the textbook by Davis and Nelson (1937) which Davis wrote with another colleague from the Cowles Commission.

<sup>9</sup>Davis (1941b, pp. 45–50) argues that the Pareto law in the upper tail of the income distribution should be reflected in the upper tails of the distributions of measures of intelligence and skill. He criticizes Binet’s Intelligence Quotient for not having such a distribution in its upper tail and provides data on his colleagues’ proficiency at billiards which tend to support his thesis.

<sup>10</sup>See Morgan (1987) for details.



Professor Davis in 1960 (by courtesy of the Colorado College Archives and Special Collections).

## 6 CONCLUDING REMARKS

Although Davis remained a member of the Cowles Commission and an associate editor of *Econometrica*,<sup>11</sup> he seems to have had little influence on the direction taken by mainstream econometrics after 1941. Indeed none of the papers published in the volumes<sup>12</sup> edited by Koopmans (1950) or Hood and Koopmans (1953) refers to him by name. On the other hand, his influence is clearly visible in the papers published by Hayakawa (1951) and Champernowne (1952) and in the books published by Tintner<sup>13</sup> (1952) and Lange (1959, 1978).

<sup>11</sup>Davis's own contributions to *Econometrica* comprise 16 papers published by abstract and one by title on such topics as the distribution of income and time series analysis. He also published an obituary notice for Charles Roos in 1958.

<sup>12</sup>These volumes were issued as Cowles Commission monograph 10 and Cowles Foundation monograph 14 respectively.

<sup>13</sup>Tintner's book represents an intermediate phase of the probabilistic revolution as it discusses both the old curve-fitting methods and the new maximum likelihood methods.

Thus Davis had the misfortune of publishing his books on *The Theory of Econometrics* and *The Analysis of Economic Time Series* just three years before Haavelmo formally introduced<sup>14</sup> *The Probability Approach in Econometrics* which replaces Davis's traditional estimation procedure by one based on the use of statistical models. Nevertheless, these books deserve to be studied by the historians of econometrics as they give a clear indication of the nature of the subject before the probabilistic revolution of 1944. They also deserve to be studied by the historians of mathematical economics and time series analysis as they contain a considerable body of material which is of particular interest to them.

#### APPENDIX: KELVIN'S DICTUM

In his history of the Cowles Commission, Christ (1952, p. 61) notes that its motto<sup>15</sup> from 1932 to 1952,

*Science is Measurement* . . . was originally suggested by one of Davis' favourite quotations from the British physicist Lord Kelvin, to the effect that when you can measure what you are speaking about, you know something about it, but when you cannot measure it, your knowledge is a meagre and unsatisfactory kind.

(See Davis, 1941b, p. 3.) Christ (1952, p. 20) also notes that from 1939 the Cowles Commission was lodged in a suite of four offices on the fourth floor of the Social Science Research Building at the University of Chicago. But he fails to mention that a longer version of Kelvin's dictum is carved on the façade of this building. The origins of this longer version are traced in an interesting paper by Merton *et al.* (1984). Also see Hildreth (1986).

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<sup>14</sup>Haavelmo's (1944) paper had been circulated in manuscript in 1941.

<sup>15</sup>In 1952 the motto was changed to *Theory and Measurement* at the suggestion of Clifford Hildreth.

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