

This Week's Citation Classic

**Theil H. *Economics and information theory*. Amsterdam: North-Holland, 1967. 488 p.
[Center Math. Stud. Business Econ., Univ. Chicago. Chicago, IL]**

This book describes applications of information theory to problems in economics, such as the measurement of income inequality, industrial concentration, concentration in international trade, and the fit of allocation models. [The *Science Citation Index*[®] (*SCI*[®]) and the *Social Sciences Citation Index*[™] (*SSCI*[™]) indicate that this book has been cited over 270 times since 1967.]

Henri Theil
Center for Mathematical Studies
in Business and Economics
University of Chicago
Chicago, IL 60637

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"The origin of this book is clear in my mind, although I cannot pin-point the year in which it happened (it must have been in the early 1960s). I was working in consumption theory and obtained unfamiliar expressions such as $\sum_i \omega_i \log w_i$, where w_i is the budget share of good i (the share of this good in the consumer's total expenditure). Leafing through my father's encyclopedia in Utrecht, the Netherlands, I found that this expression had something to do with the entropy measure in physics. That came as a great surprise, because I vividly remembered that when I was a graduate student at the

University of Amsterdam around 1950, my statistics teacher David van Dantzig had assured me that the entropy concept would be important in economics also.

"These developments were encouraging and potentially exciting, but they did not enable me to do very much because most of the relevant literature is in physics and electrical engineering, and I was not an expert in either of those areas (nor am I now). The break through came when I found Koopman and Kimball's paper on information theory, which is formulated largely in mathematical terms.¹ Thereafter I derived numerous applications of informational concepts in economics. Perhaps the best known application is that to the measurement of income inequality, thus accounting for the book's high citation. In this book I proposed two informational inequality measures, both of which have attractive decomposition properties. Recently Bourguignon proved that these two measures are the only ones which have these properties.²

"To a large extent, the appearance of the book in its present form was caused by my move from Rotterdam to Chicago in 1966. I recognized that the large-scale applicability of informational concepts to economics was mainly caused by the frequent occurrence of 'shares,' or allocation proportions which are nonnegative and add up to 1, and I also recognized that economics is not the only social science in which such proportions play a prominent role. However, extending these approaches to other social sciences was something that I could do only after I had settled in Chicago."³

1. Koopman B O & Kimball G E. Information theory. (Assembled by the Operations Research Center. MIT) Notes on operations research 195V. Cambridge, MA: Technology Press. MIT. 1959. p. 188-210.
2. Bourguignon F. Decomposable income inequality measures. *Econometrica* 47:901-20. 1979.
3. Theil H. Statistical decomposition analysis with applications in the social and administrative sciences. Amsterdam: North-Holland. 1972. 337 p.