

# Economics and the Price-Index

**S. N. Afriat**

**Carlo Milana**

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**A**friat is the guru of the price index ... his work is a classic illustration of how much we learn from new ways of thinking.

**Angus Deaton**

Dwight D. Eisenhower Professor of International Affairs  
Professor of Economics  
Princeton University, USA

**R**esearchers interested in price indexes, inter-area comparisons, revealed preference theory, or productivity measurement will find this book an enlightening, entertaining, and highly creative treatise on where the theory should go from here.

**Marshall Reinsdorf**

Senior Research Economist  
US Bureau of Economic Analysis

**S**ydney Afriat is famous for his unique and penetrating insights, often very unsettling to those who have worked long and hard in a field—without ever seeing what is obvious to Sydney, who then formulates it neatly in very compact mathematics. In this case he has a very good co-author who has independently developed a critical examination of many current writings on the subject, and has helped him develop his insights in practical directions. This monograph will very likely render many current discussions of index numbers obsolete.

**Edward Nell**

Malcolm B. Smith Professor of Economics  
New School University, NY

**N**ew generation price index workers can have pleasure to escape stagnation in the Irving Fisher trap and catch on to the new approach with its conceptual fidelity and computational elegance.

**Preface**



# Economics and the Price-Index

A theft amounting to £1 was a capital offence in 1260, and a judge in 1610 affirmed the law could not then be applied since £1 was no longer what it was. Such association of money with a date is well recognized for its importance in very many different connections. Thus arises the need to know how to convert an amount at one date into an equivalent amount at another date. In other words, a price index. The longstanding question concerning how such an index should be constructed is known as ‘The Index-Number Problem’

The ordinary consumer price index or CPI represents a practical response to the need. A sense for the equivalence that should give it some legitimacy, and the faithfulness, or truth, of a price index to that sense, becomes an issue giving rise to extensive thought and theory about price indices, to which over the decades a remarkable number of economists have each contributed a word, or volume. However there have been hold-ups at a most basic level cleared at last in this book.

**S. N. Afriat**, Piazza dell’Abbadia 4, 53100 Siena, Italy, [s.afriat@gmail.com](mailto:s.afriat@gmail.com), member of the Scientific Committee of the European Service Economic Forum 2008, associated lately with Bilkent University, Ankara, and the University of Siena, and as Jean Monnet Fellow with the European University Institute, San Domenico di Fiesole/Firenze; has a long and distinguished record of publishing at the interface of mathematics and economics; his recent books *The Market: equilibrium, stability, mythology* and *The Price Index and its Extension: A chapter in economic measurement* are also published by Routledge (2003 and 2005); he is rightly famous for his work in the field of the price index, and this latest book, coming from knowledge and initiative of collaborator Carlo Milana, connoisseur and critic in the field, who stirred into life almost forgotten work of twenty five years ago, which embodies their community of opinion and makes a break in the subject, will interest economists of an academic and professional nature the world over.

**Carlo Milana**, research director at ISAE (Istituto di Studi e Analisi Economica), Piazza dell’Indipendenza, 4, 00185 Roma, Italy, [c.milana@isae.it](mailto:c.milana@isae.it); 70 publications in the field of competitiveness, productivity, trade and industrial policies; member of the Italian National Price Committee of the Ministry of Budget and Economic Planning 1996-2001; leads Italian part of the Specific Targeted Research Project “EUKLEMS-2003—Productivity in the European Union: A Comparative Industry Approach” supported by the European Commission with Contract No. 502049 (SCS8) within the Sixth Framework Programme; during 1980s under contract with the Italian CNR he contributed to analysis of the restructuring activities in Italy and other industrialized countries by reconstructing time series within the KLEMS approach; during 1990s in collaboration with Japanese co-authors he extended the methodology of international comparison of productivity in integrated input-output accounts; had part in OECD reports and publications on technology, productivity and job creation, and the productivity manual.



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*foreword* **Angus Deaton**

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- 2 The Price-Level Computation Method
- 3 Price-Level Computation: Illustrations

Bibliography

## **PART II**

### **Precursor**

- 1 The system of inequalities  $a_{rs} > x_s - x_r$ .

S. N. Afriat, *Research Memorandum* No. 18 (October 1960)  
Econometric Research Program, Princeton University  
*Proc. Cambridge Phil. Soc.* 59 (1963)

## 2 On the constructibility of consistent price indices between several periods simultaneously.

S. N. Afriat, in *Essays in Theory and Measurement of Demand: in honour of Sir Richard Stone*

edited by Angus Deaton, Cambridge University Press, 1981

## 3 The Theory of Exact and Superlative Index Numbers Revisited

Carlo Milana, Istituto di Studi e Analisi Economica, Roma

*EUKLEMS Working Paper* No. 3, 2005

<http://www.euklems.net>.

# Appendices

## 1 The price index as a utility based concept

### 1.1 Original approach

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Conical *v.* homogeneous &c

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## 4 Software

BASIC computer program

BBC BASIC for Windows

developed by Richard Russell

[info@rtrussell.co.uk](mailto:info@rtrussell.co.uk).

## **Notes**

**1** Multilateral indices

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# Foreword

Sydney Afriat is the guru of the price index. As a young mathematician, he arrived at Richard Stone's Department of Applied Economics in Cambridge in the early 1950s, then the great center of research on theoretical and applied consumer behaviour. He soon realized that neither he nor anyone else knew very much about what was meant by "the price index", in spite of being part of the everyday discourse of economics. In the half century since then, he has been exploring the foundations of the topic. Over the years, he has produced beautiful theorems on the topic, many of them completely unexpected even by the *cognoscenti* of the topic. And where he has led, the profession has followed, often many years later. Along the way, his work has fathered important incidental areas in economics, perhaps most notably the non-parametric analysis of demand, that has carried into other areas, like the analysis of efficiency with his frontier production function that extends Farrell's method and the stochastic frontier.

Afriat is one of those rare and rarely gifted individuals who think differently from everyone else. What is obvious to him can sometimes seem bizarre to others, especially at first, and his vision of "the price index" often differs sharply from those that dominate the profession. Yet his work is a classic illustration of how much we learn from new ways of thinking, and how the bizarre and unfamiliar conceptions and results of an idiosyncratic leader can become the orthodoxy of the next generation.

The last book presented a coherent discussion of fifty years of astonishingly creative work on the price index. Some of the analysis had appeared before but much had not. Afriat's many friends may have welcomed the definitive account, as also those who had not previously had the opportunity to understand and enjoy the work.

So much is said in my foreword to that book. Now comes the surprise, that the story is not there ended. At the heart of this new book is a paper of twenty-five years ago in a volume in honour of Sir Richard Stone which I edited, reproduced in Part II. Yes very original, quite unlike anything seen before, and then what? Read on.

**Angus Deaton**

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