

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Nonlinear Dynamics and Economics presents some of the recent developments in non-linear economic dynamics along with related research from associated fields, including mathematics, statistics, biology, and physics. This volume comprises the tenth in the *International Symposia in Economic Theory and Econometrics* series under the general editorship of William Barnett. This proceedings volume includes revisions of the most important papers presented at a conference held at the European University Institute in Florence on July 6–17, 1992, along with revisions of the related, invited papers presented at the annual meetings of the American Statistical Association held in San Francisco on August 8–12, 1993.

The organizers of the Florence conference were Mark Salmon at the European University Institute in Florence, Alan Kirman of the Université d'Aix–Marseille III, and David Rand and Robert Mackay from the Mathematics Department at Warwick University in England. The joint proceedings arrangement between sessions of the annual meetings of the American Statistical Association and the Florence conference was made possible by the fact that William Barnett was Program Chair for the American Statistical Association in Business and Economic Statistics during the year 1993.

Funding for the Florence conference came from a grant from the European Science Foundation through the Centre for Economic Policy Research in London and the European University Institute in Florence. The proceedings volumes from conferences in this series are sponsored by the IC² Institute at the University of Texas at Austin and are cosponsored by the RGK Foundation.

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Nonlinear dynamics and economics

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

International Symposia in Economic Theory and Econometrics

Editor

William A. Barnett, Washington University in St. Louis

Other books in the series

William A. Barnett and A. Ronald Gallant

*New approaches to modeling, specification selection, and
econometric inference*

William A. Barnett and Kenneth J. Singleton

New approaches to monetary economics

William A. Barnett, Ernst R. Berndt, and Halbert White

Dynamic econometric modeling

William A. Barnett, John Geweke, and Karl Shell

Economic complexity

William A. Barnett, James Powell, and George E. Tauchen

Nonparametric and semiparametric methods in econometrics and statistics

William A. Barnett, Bernard Cornet, Claude d'Aspremont,

Jean J. Gabszewicz and Andreu Mas-Colell

Equilibrium theory and applications

William A. Barnett, Melvin J. Hinich, and Norman J. Schofield

Political economy: Institutions, competition and representation

William A. Barnett, Hervé Moulin, Maurice Salles, and Norman J. Schofield

Social choice, welfare, and ethics

William A. Barnett, Giancarlo Gandolfo, and Claude Hillinger

Dynamic disequilibrium modeling

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Nonlinear dynamics and economics

Proceedings of the Tenth International Symposium
in Economic Theory and Econometrics

Edited by

WILLIAM A. BARNETT

Washington University in St. Louis

ALAN P. KIRMAN

Université d'Aix-Marseille III

MARK SALMON

European University Institute



Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Mexico City

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.orgInformation on this title: www.cambridge.org/9780521471411

© William A. Barnett, Alan P. Kirman, and Mark Salmon, 1996

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 1996

*A catalogue record for this publication is available from the British Library**Library of Congress Cataloguing in Publication Data*International Symposium in Economic Theory and Econometrics
(10th: 1992, Florence, Italy)

Nonlinear dynamics and economics: proceedings of the Tenth International Symposium in Economic Theory and Econometrics / edited by William A. Barnett, Alan P. Kirman, and Mark Salmon.

p. cm. – (International symposia in economic theory and econometrics)

Papers presented at a conference held at the European University in Florence, Italy, July 6–17, 1992 and invited papers presented at the annual meeting of the American Statistical Association in San Francisco Aug. 8–12, 1993.

ISBN 0-521-47141-9

1. Statics and dynamics (Social sciences) – Congresses. 2. Economics, Mathematical – Congresses. 3. Chaotic behavior in systems – Congresses. 4. Differential equations. Nonlinear – Congresses. I. Barnett, William A. II. Kirman, A. P. III. Salmon, Mark. IV. American Statistical Association. V. Title. VI. Series. 96-5301
HB145.159 1992 CIP
330'.01'51 – dc20

ISBN 978-0-521-47141-1 Hardback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate. Information regarding prices, travel timetables, and other factual information given in this work is correct at the time of first printing but Cambridge University Press does not guarantee the accuracy of such information thereafter.

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Contents

	<i>Series editor's introduction</i>	vii
	<i>Contributors</i>	x
I	Instability in economic theory	
1	Chaotic dynamics in overlapping generations models with production <i>Alfredo Medio and Giorgio Negrone</i>	3
2	Evolutionary chaos: Growth fluctuations in a Schumpeterian model of creative destruction <i>Gerald Silverberg and Doris Lehnert</i>	45
II	Nonlinearity in financial markets	
3	Detection of nonlinearity in foreign-exchange data <i>Paolo Guarda and Mark Salmon</i>	77
4	Chaos and nonlinear dynamics in futures markets <i>Apostolos Serletis and Paul Dormaar</i>	113
5	Continuous-time chaos in stock market dynamics <i>Kehong Wen</i>	133
III	Tests for nonlinearity and chaos	
6	An experimental design to compare tests of nonlinearity and chaos <i>William A. Barnett, A. Ronald Gallant, Melvin J. Hinich, Jochen A. Jungeilges, Daniel T. Kaplan, and Mark J. Jensen</i>	163

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

vi	Contents	
7	Testing time series for nonlinearities: The BDS approach <i>W. D. Dechert</i>	191
8	Searching for nonlinearity in mean and variance <i>Ted Jaditz and Chera L. Sayers</i>	201
9	Operational characteristics of White's test for neglected nonlinearities <i>J. A. Jungeilges</i>	219
10	Time series, stochastic and chaotic <i>Thomas J. Taylor</i>	267
11	Linearity testing and nonlinear modeling of economic time series <i>Timo Teräsvirta</i>	281
IV	Frequency domain methods and nonlinear business cycles	
12	The importance of being nonlinear: A frequency-domain approach to nonlinear model identification and estimation <i>Richard Ashley and Douglas Patterson</i>	297
13	Trends, shocks, persistent cycles in evolving economy: Business-cycle measurement in time-frequency representation <i>Ping Chen</i>	307
14	International evidence of business-cycle nonlinearity <i>Philip Rothman</i>	333
V	Nonlinear prediction and forecasting	
15	Local Lyapunov exponents: Predictability depends on where you are <i>Barbara A. Bailey</i>	345
16	Forecasting realignments: The case of the French franc in the exchange-rate mechanism <i>Bruce Mizrach</i>	361
17	Daily returns in international stock markets: Predictability, nonlinearity, and transaction costs <i>Steve Stachell and Allan Timmermann</i>	369
18	Nonparametric forecasts of gold rates of return <i>Thanasis Stengos</i>	393

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Series editor's introduction

This volume is the tenth in a series, called *International Symposia in Economic Theory and Econometrics*. The proceedings series is under the general editorship of William Barnett. Individual volumes in the series generally have co-editors, who differ for each volume, since the topics of the conferences change each year. The Cambridge University Press monograph series that publishes the proceedings of the conferences is sponsored by the IC² Institute at the University of Texas at Austin and are cosponsored by the RGK Foundation.¹

Much of this volume comprises the proceedings of the conference, "Nonlinear Dynamics and Economics," held at the European University Institute in Florence, Italy, on July 6–17, 1992. This volume includes the most important refereed papers presented at the conference, as well as related, invited papers presented at the annual meetings of the American Statistical Association held in San Francisco on August 8–12, 1993. This unusual joint arrangement between sessions of the annual meetings of the American Statistical Association and the Florence conference was made possible by the fact that William Barnett was Program Chair for the American Statistical Association in Business and Economic Statistics during the year 1993.

The purpose of the Florence conference was to bring together mathematicians, economists, statisticians, biologists, and physicists who are interested in nonlinear dynamics and chaos to see what cross fertilization could be achieved. The interdisciplinary nature of the conference is evident from many of the papers, although the primary area of application of the research published in this volume is economics.

The volume is divided topically into five parts: Part I concerns instability in economic theory; part II, nonlinearity in financial markets; part III, tests for nonlinearity and chaos; part IV, frequency domain methods and nonlinear business cycles; and part V, nonlinear prediction and forecasting. The organizers

IC² stands for Innovation, Creativity, and Capital

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)viii **Series editor's introduction**

of the Florence conference thankfully acknowledge financial support from a grant from the European Science Foundation through the Centre for Economic Policy Research in London and the European University Institute in Florence.

The first conference in this Cambridge series was co-organized by William Barnett and Ronald Gallant, who also co-edited that proceedings volume. That volume appeared as the volume 30, October/November 1985 edition of the *Journal of Econometrics* and has been reprinted in this Cambridge University Press monograph series as a volume entitled *New approaches to modeling, specification selection, and econometric inference*.

Beginning with the second symposium in the series, the proceedings of the symposia appear exclusively as volumes in this Cambridge University Press monograph series. The co-organizers of the second symposium and coeditors of its proceedings volume were William Barnett and Kenneth Singleton. The topic (and volume title) was *New approaches to monetary economics*. The co-organizers of the third symposium, which was on *Dynamic econometric modeling*, were William Barnett and Ernst Berndt; and the co-editors of that proceedings volume were William Barnett, Ernst Berndt, and Halbert White. The co-organizers of the fourth symposium and co-editors of its proceedings volume, which was entitled *Economic complexity: Chaos, sunspots, bubbles and nonlinearity*, were William Barnett, John Geweke, and Karl Shell. The co-organizers of the fifth symposium and co-editors of its proceedings volume, which was on *Nonparametric and semiparametric methods in econometrics and statistics*, were William Barnett, James Powell, and George Tauchen. The co-organizers and proceedings co-editors of the sixth symposium, which was on *Equilibrium theory and applications*, were William Barnett, Bernard Cornet, Claude d'Aspremont, Jean Gabszewicz, and Andreu Mas-Colell. The co-organizers of the seventh symposium, which was on *Political economy*, were William Barnett, Melvin Hinich, Douglass North, Howard Rosenthal, and Norman Schofield. The co-editors of that proceedings volume were William Barnett, Melvin Hinich, and Norman Schofield.

The eighth symposium was part of a large-scale conference on *Social choice, welfare, and ethics*. That conference was held in Caen, France, on June 9–12, 1993. The organizers of the conference were Maurice Salles and Hervé Moulin. The co-editors of that proceedings volume were William Barnett, Hervé Moulin, Maurice Salles, and Norman Schofield. The ninth volume in the series was on *Dynamic disequilibrium modeling: Theory and applications*, and was organized by Claude Hillinger at the University of Munich, Giancarlo Gandolfo at the University of Rome "La Sapienza," A. R. Bergstrom at the University of Essex, and P. C. B. Phillips at Yale University. The co-editors of the proceedings volume were William Barnett, Giancarlo Gandolfo, and Claude Hillinger.

The organizers of the Florence conference, which produced part of this tenth volume, were Mark Salmon and Alan Kirman at the European University

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Series editor's introduction

ix

Institute in Florence, and David Rand and Robert MacKay from the Mathematics Department at Warwick University in England, while the organizer of the invited American Statistical Association sessions, which produced some of the papers in the volume, was William Barnett. Although the dates of the Florence conference preceded those of the eighth and ninth conferences in the series, the delayed sequencing of this proceedings volume within the series resulted from the lengthy refereeing procedure adopted for this volume, and from the merging of some of the papers from the Florence conference with some of the invited papers presented at the American Statistical Association meetings held in San Francisco on August 8–12, 1993.

The intention of the volumes in this proceedings series to provide **refereed** journal-quality collections of research papers of unusual importance in areas of currently highly visible activity within the economics profession. Because of the refereeing requirements associated with the editing of the proceedings, the volumes in the series do not necessarily contain all of the papers presented at the corresponding symposia.

William A. Barnett

Washington University in St. Louis

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)

Contributors

Richard Ashley
Department of Economics
Virginia Tech

Barbara A. Bailey
Department of Statistics
North Carolina State University

William A. Barnett
Department of Economics
Washington University in St. Louis

Ping Chen
Center for Studies in Statistical
Mechanics and Complex Systems
University of Texas at Austin

W. D. Dechert
Department of Economics
University of Wisconsin

Paul Dormaar
Department of Economics
University of Calgary

A. Ronald Gallant
Department of Economics
University of North Carolina at
Chapel Hill

Paolo Guardo
Department of Economics
European University Institute

Melvin Hinich
Department of Government
University of Texas at Austin

Ted Jaditz
Bureau of Labor Statistics
Department of Labor

Mark J. Jensen
Department of Economics
Southern Illinois University at
Carbondale

Jochen Jungeilges
Department of Economics
University of Osnabrück

Daniel Kaplan
Department of Physiology
McGill University

Doris Lehnert
Institute for Social Research
University of Stuttgart

Alfredo Medio
Department of Economics
University of Venice

Bruce Mizraeh
Department of Economics
Rutgers University

Cambridge University Press
978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics
William A. Barnett, Alan P. Kirman and Mark Salmon
Frontmatter
[More information](#)

Contributors

xi

Giorgio Negroni
Department of Economics
Catholic University of Milan and
University of Pavia

Douglas Patterson
Department of Finance
Virginia Tech

Philip Rothman
Department of Economics
East Carolina University

Mark Salmon
Department of Economics
European University Institute

Steve Satchell
Birkbeck College
University of London

Chera Sayers
Department of Economics
University of Houston

Apostolos Serletis
Department of Economics
University of Calgary

Gerald Silverberg
ILASA

Thanasis Stengos
Department of Economics
University of Guelph

Thomas J. Taylor
Department of Mathematics
Arizona State University

Timo Teräsvirta
Stockholm School of Economics

Allan Timmermann
Birkbeck College
University of London

Kehong Wen
Haas School of Business
University of California at Berkeley

Cambridge University Press

978-0-521-47141-1 - Nonlinear Dynamics and Economics : Proceedings of the Tenth
International Symposium in Economic Theory and Econometrics

William A. Barnett, Alan P. Kirman and Mark Salmon

Frontmatter

[More information](#)
