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Edited by William A. Barnett, Giancarlo Gandolfo and Claude Hillinger
Frontmatter
More information

Dynamic Disequilibrium Modeling presents some recent surveys and developments in dynamic disequilibrium and continuous time econometric modeling, along with related research from associated fields. Specific areas covered include applications in business cycles and growth, tests for nonlinearity, rationing and disequilibrium dynamics, and demographic and international applications.

The contents of this volume are drawn from the proceedings of the ninth conference in *The International Symposia in Economic Theory and Econometrics* series, under the general editorship of William Barnett. The proceedings volume includes the most important papers presented at a conference held at the University of Munich on August 31 – September 4, 1993. The symposia in the series are sponsored by the IC^2 Institute at the University of Texas at Austin and are cosponsored by the RGK Foundation. This ninth conference was also cosponsored by the Deutsche Forschungsgemeinschaft (DFG) and the Bavarian Ministry of Education, along with the Seminar for Mathematical Economics (SEMECON), the Center for Economic Studies (CES), and the Economics Department at the University of Munich. The symposium was held at the University of Munich.

The organizers of the ninth symposium, which produced the current proceedings volume, were 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.

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Frontmatter
More information

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Proceedings of the Ninth International Symposium in Economic Theory and Econometrics

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Information on this title: www.cambridge.org/9780521462754

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First published 1996
First paperback edition 2011

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 (9th : 1993 : University of Munich)

Dynamic disequilibrium modeling : theory and applications : proceedings of the Ninth International Symposium in Economic Theory and Econometrics / edited by William A. Barnett, Giancarlo Gandolfo, Claude Hillinger.

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

ISBN 0-521-46275-4 (hc)

1. Equilibrium (Economics) – Econometric models – Congresses. I. Barnett, William A. II. Gandolfo, Giancarlo. III. Hillinger, Claude, 1930– . IV. Title. V. Series.

HB145.I59 1993
330′.01′5195 – dc20 95-47537
CIP

ISBN 978-0-521-46275-4 Hardback
ISBN 978-0-521-17497-8 Paperback

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Frontmatter
More information

Contents

Volume editors' preface *page* vii
Series editor's preface xi
List of contributors xiii

I Survey papers

1 Survey of continuous time econometrics 3
A. R. Bergstrom

2 Dynamic disequilibrium economics: history, conceptual foundations, possible futures 27
Claude Hillinger

3 The role of continuous time disequilibrium models in macroeconomics 67
Clifford R. Wymer

II Continuous time models

4 Nonlinear estimation of a nonlinear continuous time model 127
Giancarlo Gandolfo, Pier Carlo Padoan, Giuseppe De Arcangelis, & Clifford R. Wymer

5 Endogenous regime switching in a model of accumulation, credit, and monetary policy 151
D. Delli Gatti, M. Gallegati, & P. C. Padoan

6 A note on continuous time dynamic disequilibrium macroeconometric modeling of the United Kingdom 185
K. B. Nowman

7 Evaluation of discrete and continuous time dynamic models by spectral methods with an application to automobile demand 197
Michael Reiter

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978-0-521-46275-4 - Dynamic Disequilibrium Modeling: Theory and Applications: Proceedings of the Ninth International Symposium in Economic Theory and Econometrics
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Frontmatter
More information

8 A continuous time method for modeling optimal investment subject to adjustment costs and gestation lags 231
Peter A. Zadrozny

III Business cycles and growth

9 Monopolistic price setting, subjective demand, and the business cycle 263
Alfred Maussner

10 The G7 countries: a multivariate description of the business cycle stylized facts 283
Ulrich Woitek

IV Tests for nonlinearity

11 Comparisons of the available tests for nonlinearity and chaos 313
William A. Barnett, A. Ronald Gallant, Melvin J. Hinich, Mark Jensen, & Jochen Jungeilges

12 Testing for nonlinearity in the exchange-rate series: an empirical investigation of the lira/dollar spot rate 347
Laura Sabani

V Rationing and disequilibrium dynamics

13 Dynamic stochastic choice modeling of disequilibrium in an economy 365
B. Dejon, F. Graef, H.-J. Meier, & J. Novotný

14 Nonlinear models of employment adjustment 395
Werner Smolny

15 A simulation study of disequilibrium price dynamics 421
Claus Weddepohl

VI Demographic and international applications

16 Disequilibrium in the Canadian population distribution 447
William P. Anderson & Yorgos Y. Papageorgiou

17 Optimality of the target-zone regime 475
Giuseppe De Arcangelis

18 Neighborhood feedbacks, endogenous stratification, and income inequality 505
Steven N. Durlauf

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Volume editors' preface

The contents of this volume comprise the proceedings of the conference, "Dynamic Disequilibrium Modeling: Theory and Applications," held at the University of Munich in Munich, Germany, on August 31 – September 4, 1993. This proceedings volume includes 18 of the most important refereed papers presented at that conference.

The purpose of the conference was to document the achievements of dynamic disequilibrium (DDE) modeling, particularly in the construction of theoretical and econometric models. The major effort and greatest progress in DDE modeling has been in the area of continuous time macroeconometrics. That literature is the principal focus of the survey papers in the first section, and the methodology is used in many of the other papers appearing in this volume.

Macroeconomics, by its very nature, is characterized by compromises. These compromises may involve placing emphasis on: partial equilibrium at the expense of general equilibrium; elementary goods and individual agents at the expense of aggregation over goods and economic agents; linearity at the expense of the inherent nonlinearity of microeconomic theory; infinitely rapid adjustment at the expense of rational transient response; perfect memory and complete information at the expense of learning; perfect rationality at the expense of bounded rationality; small models at the expense of real-world explanatory power; perfect certainty modeling at the expense of risk aversion; static modeling at the expense of dynamics; and/or atheoretical time-series methodology at the expense of economic theory. Dynamic disequilibrium theory represents a middle ground, providing the ability to use much structural economic theory in a manner that permits coherent econometric application with existing macroeconomic data.

In its most elegant manifestations, DDE modeling uses continuous time macroeconometric methods, which permit the estimation of the parameters of systems of differential equations in a manner providing accurate

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Frontmatter
More information

inferences about dynamics. The DDE approach is based upon the generation of a stochastically equivalent discrete time analogous model. This methodology is important because the economy itself is a continuous time dynamical system, whereas the data are available only in discrete time as point observations. The common practice of modeling the theory itself in discrete time connects theory with available data in a convenient and immediate manner. However, that greatly simplifying approach is less satisfactory than continuous time macroeconometrics, since discrete time economic theory unreasonably implies that all transactions occur at the boundaries of time intervals. In a measure-theoretic sense, discrete time economic models imply that the economy exists almost nowhere within the time domain – and does not exist almost everywhere within that domain – because the sequence of boundary points of discrete time intervals has Lebesgue measure zero on the real-line time domain.

The estimation of the parameters of difference equation models produced from discrete time economic theory can result in seriously erroneous inferences regarding dynamic response rates in the continuous time real world. The computationally difficult, but very sophisticated, approach of continuous time macroeconometrics addresses these issues directly through the generation and estimation of the parameters of a stochastically equivalent discrete time analogous model. The advantages of continuous time macroeconometrics are important. One reason for those many advantages is that dynamic adjustment disappears only in the steady state, which characterizes no one's views of the real world.

Since the subject of DDE is large and growing, the conference could not include papers representing all constructive areas of research in the DDE tradition. One such important omitted area, which nevertheless merits explicit mention in this introduction, is the research on disequilibrium growth theory begun by Takatoshi Ito in 1980 and extended in many recently published papers by Ito and by other economists.

This volume is divided into six parts, corresponding to the six major topics of the conference. Part I of the volume consists of three survey papers. Part II's topic is continuous time models. Part III consists of two papers on business cycles and growth, and Part IV deals with tests for nonlinearity. Part V introduces rationing into disequilibrium dynamics. Finally, Part VI contains three papers on demographic and international applications.

At the University of Munich the conference benefited from the support of the Economics Department and its Dean, Professor Dr. Klaus Zimmermann, as well as of the Center for Economic Studies (CES), directed by Professor Dr. Hans-Werner Sinn. The organizational work was managed at the Seminar for Mathematical Economics (SEMECON) by

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Frontmatter
More information

Ulrich Woitek, assisted by Secretaries Anne Kaiser and Christa Rosak as well as an enthusiastic crew of students. The editors thankfully acknowledge the financial support of the IC² Institute at the University of Texas at Austin, the RGK Foundation in Austin, Texas, the Deutsche Forschungsgemeinschaft (DFG), and the Bavarian Ministry of Education.

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Frontmatter
More information

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Frontmatter
More information

Series editor's preface

The conference that produced this proceedings volume is the ninth in a conference series entitled *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 conference topics change each year. The symposia in the series are sponsored by the IC^2 Institute at the University of Texas at Austin and are cosponsored by the RGK Foundation.[1]

The first conference in this Cambridge series was co-organized by William Barnett and Ronald Gallant, who also co-edited the proceedings volume. That volume appeared as the volume 30, October/November 1985 edition of the *Journal of Econometrics* and has been reprinted as a volume in this Cambridge University Press monograph series. The topic was "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 co-editors of its proceedings volume were William Barnett and Kenneth Singleton. The topic was "New Approaches to Monetary Economics." The co-organizers of the third symposium, "Dynamic Econometric Modeling," were William Barnett and Ernst Berndt; 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, "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, "Nonparametric and Semiparametric Methods in Econometrics and Statistics," were William Barnett, James Powell, and George Tauchen.

[1] IC^2 stands for Innovation, Creativity, and Capital.

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Frontmatter
More information

The co-organizers and proceedings co-editors of the sixth symposium, "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, "Political Economy: Institutions, Competition, and Representation," 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 symposium, which produced this volume, was organized by Giancarlo Gandolfo, Claude Hillinger, A. R. Bergstrom, and Peter C. B. Phillips.

The tenth volume in the series will be the joint proceedings of a conference held in Florence, Italy, on "Nonlinear Dynamics in Economics" and the invited sessions of the annual meetings of the American Statistical Association held in San Francisco. The editors will be William Barnett, Mark Salmon, and Alan Kirman. The eleventh volume will be produced from the proceedings of a conference to be held at Washington University in St. Louis in September 1995. That conference, co-organized by William Barnett, Andrew Lo, Lars Hansen, and George Tauchen, is on the topic of "Computation and Estimation in Finance and Economics."

The intention of the volumes in the proceedings series is 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.

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