

Computational Approaches To Economic Problems

This volume is centered around the issue of market design and resulting market dynamics. The economic crisis of 2007-2009 has once again highlighted the importance of a proper design of market protocols and institutional details for economic dynamics and macroeconomics. Papers in this volume capture institutional details of particular markets, behavioral details of agents' decision making as well as spillovers between markets and effects to the macroeconomy. Computational methods are used to replicate and understand market dynamics emerging from interaction of heterogeneous agents, and to develop models that have predictive power for complex market dynamics. Finally treatments of overlapping generations models and differential games with heterogeneous actors are provided.

Abstract: In these essays, I consider the economic dynamics that have important implications to policy problems. I use the dynamic optimization and computational methods to answer questions related to interesting economic problems.

Modern business cycle theory and growth theory uses stochastic dynamic general equilibrium models. In order to solve these models, economists need to use many mathematical tools. This book presents various methods in order to compute the dynamics of general equilibrium models. In part I, the representative-agent stochastic growth model is solved with the help of value function iteration, linear and linear

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quadratic approximation methods, parameterised expectations and projection methods. In order to apply these methods, fundamentals from numerical analysis are reviewed in detail. In particular, the book discusses issues that are often neglected in existing work on computational methods, e.g. how to find a good initial value. In part II, the authors discuss methods in order to solve heterogeneous-agent economies. In such economies, the distribution of the individual state variables is endogenous. This part of the book also serves as an introduction to the modern theory of distribution economics. Applications include the dynamics of the income distribution over the business cycle or the overlapping-generations model. In an accompanying home page to this book, computer codes to all applications can be downloaded.

This concise and comprehensive introduction to economics offers readers at all levels a more realistic approach to understanding the elements of resource and product markets, including the role of business decisions; technological change; product differentiation; uncertainty; and the optimal location of activities. With the book's easy-to-use software package for computations, even non-economists will become strongly motivated and can gain a proficiency in economic analysis as well as in practical and professional decision-making skills. End-of-chapter problems, computer exercises, programming examples, and numerous diagrams further enhance the book's usefulness.

The special session on Decision Economics (DECON) is a scientific forum held

annually and intended to share ideas, projects, research results, models and experiences associated with the complexity of behavioural decision processes and socio-economic phenomena. DECON 2017 was held at the Polytechnic of Porto, ISEP, Portugal, as part of the 14th International Conference on Distributed Computing and Artificial Intelligence. For the second consecutive year, the Editors of this book have drawn inspiration from Herbert A. Simon's immense body of work and argue that Simon precipitated something akin to a revolution in microeconomics focused on the concept of decision-making. Further, it is worth noting that the recognition of relevant decision-making takes place in a range of critical subject areas and research fields, including economics, finance, information systems, small and international business management, operations, and production. Therefore, decision-making issues are of fundamental importance in all branches of economics addressed both deductively and inductively. Not surprisingly, the study of decision-making has seen growing empirical research efforts in the economic literature over the last sixty years and, more recently, a variety of insightful cutting-edge experimental, behavioural and computational approaches. Additionally, the awareness regarding generalizations and reductions to express economic concepts has led, on the one hand, to an increasing risk of spreading the language of mathematics as a rhetorical tool and, on the other hand, to an oversimplification and overlooking of some crucial details, especially when it comes to human decisions and, hence, economic behaviour. That awareness, however, has

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helped to produce an extraordinary volume of empirical research aimed at discovering how economic agents cope with complex decisions. In this sense, the international scientific community acknowledges Herbert A. Simon's research endeavours to understand the processes involved in economic decision-making and their implications for the advancement of economic professions. Within the field of decision-making, indeed, Simon's rejection of the standard decision-making models used in neoclassical economics inspired social scientists worldwide to develop research programmes in order to study decision-making empirically. The main achievements concern decision-making for individuals, firms, markets, governments, institutions, and, last but not least, science and research.

The second and revised edition of *Network Economics: A Variational Inequality Approach* provides an updated treatment of network economics through the inclusion of new theoretical results and new applications, as well as problems for self-study purposes and/or for use in the classroom. This volume remains true to the first edition in that it provides a unified treatment of finite-dimensional variational inequalities, algorithms, and applications. Physical networks are pervasive in today's society in the form of transportation networks, telecommunication networks, energy networks, and financial networks, whereas mathematical networks provide a mechanism for studying a plethora of economic equilibrium problems through a common graphic structure. *Network Economics* establishes the connections among economic equilibrium problems

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through their network structure and demonstrates how the structure can then be used to address policy interventions, as well as to construct efficient numerical schemes for the computation of equilibria. The network framework provides not only a mechanism for the graphic representation of economic problems and a means for visualizing their similarities and differences, but, in addition, a novel theoretical approach. Problems treated include: congested transportation systems, oligopolistic market equilibrium problems, problems of human migration, and general financial and economic equilibrium problems. New applications covered in this second edition include environmental networks and knowledge networks.

Computational Economics: A concise introduction is a comprehensive textbook designed to help students move from the traditional and comparative static analysis of economic models, to a modern and dynamic computational study. The ability to equate an economic problem, to formulate it into a mathematical model and to solve it computationally is becoming a crucial and distinctive competence for most economists. This vital textbook is organized around static and dynamic models, covering both macro and microeconomic topics, exploring the numerical techniques required to solve those models. A key aim of the book is to enable students to develop the ability to modify the models themselves so that, using the MATLAB/Octave codes provided on the book and on the website, students can demonstrate a complete understanding of computational methods. This textbook is innovative, easy to read and highly focused, providing

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students of economics with the skills needed to understand the essentials of using numerical methods to solve economic problems. It also provides more technical readers with an easy way to cope with economics through modelling and simulation. Later in the book, more elaborate economic models and advanced numerical methods are introduced which will prove valuable to those in more advanced study. This book is ideal for all students of economics, mathematics, computer science and engineering taking classes on Computational or Numerical Economics.

This is a book on deterministic and stochastic Growth Theory and the computational methods needed to produce numerical solutions. Exogenous and endogenous growth models are thoroughly reviewed. Special attention is paid to the use of these models for fiscal and monetary policy analysis. Modern Business Cycle Theory, the New Keynesian Macroeconomics, the class of Dynamic Stochastic General Equilibrium models, can be all considered as special cases of models of economic growth, and they can be analyzed by the theoretical and numerical procedures provided in the textbook. Analytical discussions are presented in full detail. The book is self contained and it is designed so that the student advances in the theoretical and the computational issues in parallel. EXCEL and Matlab files are provided on an accompanying website (see Preface to the Second Edition) to illustrate theoretical results as well as to simulate the effects of economic policy interventions. The structure of these program files is described in "Numerical exercise"-type of sections, where the output of these programs

is also interpreted. The second edition corrects a few typographical errors and improves some notation.

Computational economics has been at the forefront in stimulating the development of mathematical methodologies for the analysis and solution of complex, large-scale problems. The past decade, in particular, has witnessed a dramatic growth of interest in this area. Supported by the increasing availability of data and advances in computer architectures, the scale and scope of problems that can now be handled are unveiling new horizons in both theoretical modeling and policy analysis. Accompanying the activity in computational economics is a need for the unification, documentation, and presentation of fundamental methodologies for use by both researchers and practitioners. This volume aims to make a contribution in this direction. The focus of this book is on network economics. Physical networks are pervasive in today's society, be they in the form of transportation networks, telecommunication networks, energy pipelines, electric power networks, etc. Mathematical networks, on the other hand, may be used to represent not only physical networks but also interactions among economic agents. In many applications, the network representation of an economic equilibrium problem may be abstract in that the nodes of the network need not correspond to locations in space and the links of the network to trade or travel routes. This edited volume focuses on big data implications for computational social science and humanities from management to usage. The first part of the book covers geographic data, text corpus data, and social media data, and exemplifies their concrete applications in a wide range of fields including anthropology, economics, finance, geography, history, linguistics, political science, psychology, public health, and mass communications. The second part of the book

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provides a panoramic view of the development of big data in the fields of computational social sciences and humanities. The following questions are addressed: why is there a need for novel data governance for this new type of data?, why is big data important for social scientists?, and how will it revolutionize the way social scientists conduct research? With the advent of the information age and technologies such as Web 2.0, ubiquitous computing, wearable devices, and the Internet of Things, digital society has fundamentally changed what we now know as "data", the very use of this data, and what we now call "knowledge". Big data has become the standard in social sciences, and has made these sciences more computational. Big Data in Computational Social Science and Humanities will appeal to graduate students and researchers working in the many subfields of the social sciences and humanities.

Handbook of Computational Economics summarizes recent advances in economic thought, revealing some of the potential offered by modern computational methods. With computational power increasing in hardware and algorithms, many economists are closing the gap between economic practice and the frontiers of computational mathematics. In their efforts to accelerate the incorporation of computational power into mainstream research, contributors to this volume update the improvements in algorithms that have sharpened econometric tools, solution methods for dynamic optimization and equilibrium models, and applications to public finance, macroeconomics, and auctions. They also cover the switch to massive parallelism in the creation of more powerful computers, with advances in the development of high-power and high-throughput computing. Much more can be done to expand the value of computational modeling in economics. In conjunction with volume one (1996) and volume two (2006), this volume offers a remarkable picture of the recent development of economics as a science as

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well as an exciting preview of its future potential. Samples different styles and approaches, reflecting the breadth of computational economics as practiced today Focuses on problems with few well-developed solutions in the literature of other disciplines Emphasizes the potential for increasing the value of computational modeling in economics

Computational models and methods are central to the analysis of economic and financial decisions. Simulation and optimisation are widely used as tools of analysis, modelling and testing. The focus of this book is the development of computational methods and analytical models in financial engineering that rely on computation. The book contains eighteen chapters written by leading researchers in the area on portfolio optimization and option pricing; estimation and classification; banking; risk and macroeconomic modelling. It explores and brings together current research tools and will be of interest to researchers, analysts and practitioners in policy and investment decisions in economics and finance.

This is the third book in a series on Computational Methods in Earthquake Engineering. The purpose of this volume is to bring together the scientific communities of Computational Mechanics and Structural Dynamics, offering a wide coverage of timely issues on contemporary Earthquake Engineering. This volume will facilitate the exchange of ideas in topics of mutual interest and can serve as a platform for establishing links between research groups with complementary activities. The computational aspects are emphasized in order to address difficult engineering problems of great social and economic importance.

This volume contains a selection of papers presented at the first conference of the Society for Computational Economics held at ICC Institute, Austin, Texas, May 21-24, 1995. Twenty-two papers are included in this volume, devoted to applications of computational methods for the

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empirical analysis of economic and financial systems; the development of computing methodology, including software, related to economics and finance; and the overall impact of developments in computing. The various contributions represented in the volume indicate the growing interest in the topic due to the increased availability of computational concepts and tools and the necessity of analyzing complex decision problems. The papers in this volume are divided into four sections: Computational methods in econometrics, Computational methods in finance, Computational methods for a social environment and New computational methods.£/LIST£

Computing has become essential for the modeling, analysis, and optimization of systems. This book is devoted to algorithms, computational analysis, and decision models. The chapters are organized in two parts: optimization models of decisions and models of pricing and equilibria. This book presents a variety of computational methods used to solve dynamic problems in economics and finance. It emphasizes practical numerical methods rather than mathematical proofs and focuses on techniques that apply directly to economic analyses. The examples are drawn from a wide range of subspecialties of economics and finance, with particular emphasis on problems in agricultural and resource economics, macroeconomics, and finance. The book also provides an extensive Web-site library of computer utilities and demonstration programs. The book is divided into two parts. The first part develops basic numerical methods, including linear and nonlinear equation methods, complementarity methods, finite-dimensional optimization, numerical integration and differentiation, and function approximation. The second part presents methods for solving dynamic stochastic models in economics and finance, including dynamic programming, rational expectations, and arbitrage pricing models in discrete

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and continuous time. The book uses MATLAB to illustrate the algorithms and includes a utilities toolbox to help readers develop their own computational economics applications. This book presents the contributions to the first Wild@Ace conference. The acronym stands for “Workshop on Industrial and Labor Dynamics — The Agent-Based Computational Approach”, and it has been the first event ever focusing on the very promising use of the agent-based simulation approach for investigation of labor economics and industrial organization issues. Agent-based models are computer models in which a multitude of agents — each embodied in a specific software code — interact. These agents can represent individuals households, firms, institutions, etc. Moreover, “special” agents can be added to observe and monitor individual and collective behavior. One of the main purpose of writing an ACE model is to gain intuitions on the two-way feedback between the microstructure and the macrostructure of a phenomenon of interest. How is it that simple aggregate regularities may arise from individual disorder? Or that a nice structure at an individual level may lead to a complete absence of regularity in the aggregate? How is it that the complex interaction of very simple individuals may lead to surprisingly complicated aggregate dynamics? Or that sophisticated agents may be unable to organize themselves in any interesting way? The book includes contributions by some of the most distinguished researchers in the field, such as the economists Alan Kirman, Giovanni Dosi, Leigh Tesfatsion and Mauro Gallegati, and the sociologist Nigel Gilbert.

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Contents:MethodologyMicrosimulation of Labor DynamicsUnderstanding Firm BehaviourIndustrial Clusters and Firm InteractionMathematical Tools Readership: Graduate students and researchers in the field of computational economics, labor economics and industrial organization. Keywords:Simulation;Agent-Based;Computational Economics;Labor;Industrial Dynamics;Innovation;Cluster;Firm Behavior

Optimal Transport Methods in Economics is the first textbook on the subject written especially for students and researchers in economics. Optimal transport theory is used widely to solve problems in mathematics and some areas of the sciences, but it can also be used to understand a range of problems in applied economics, such as the matching between job seekers and jobs, the determinants of real estate prices, and the formation of matrimonial unions. This is the first text to develop clear applications of optimal transport to economic modeling, statistics, and econometrics. It covers the basic results of the theory as well as their relations to linear programming, network flow problems, convex analysis, and computational geometry. Emphasizing computational methods, it also includes programming examples that provide details on implementation. Applications include discrete choice models, models of differential demand, and quantile-based statistical estimation methods, as well as asset pricing models. Authoritative and accessible, Optimal Transport Methods in Economics also features numerous exercises throughout that help you develop your mathematical

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agility, deepen your computational skills, and strengthen your economic intuition. The first introduction to the subject written especially for economists Includes programming examples Features numerous exercises throughout Ideal for students and researchers alike

Sociological theories of crime include: theories of strain blame crime on personal stressors; theories of social learning blame crime on its social rewards, and see crime more as an institution in conflict with other institutions rather than as individual deviance; and theories of control look at crime as natural and rewarding, and explore the formation of institutions that control crime. Theorists of corruption generally agree that corruption is an expression of the Patron–Client relationship in which a person with access to resources trades resources with kin and members of the community in exchange for loyalty. Some approaches to modeling crime and corruption do not involve an explicit simulation: rule based systems; Bayesian networks; game theoretic approaches, often based on rational choice theory; and Neoclassical Econometrics, a rational choice-based approach. Simulation-based approaches take into account greater complexities of interacting parts of social phenomena. These include fuzzy cognitive maps and fuzzy rule sets that may incorporate feedback; and agent-based simulation, which can go a step farther by computing new social structures not previously identified in theory. The latter include cognitive agent models, in which agents learn how to perceive their environment and act upon the perceptions of their

individual experiences; and reactive agent simulation, which, while less capable than cognitive-agent simulation, is adequate for testing a policy's effects with existing societal structures. For example, NNL is a cognitive agent model based on the REPAST Symphony toolkit.

Macroeconomics increasingly uses stochastic dynamic general equilibrium models to understand theoretical and policy issues. Unless very strong assumptions are made, understanding the properties of particular models requires solving the model using a computer. This volume brings together leading contributors in the field who explain in detail how to implement the computational techniques needed to solve dynamic economics models. A broad spread of techniques are covered, and their application in a wide range of subjects discussed. The book provides the basics of a toolkit which researchers and graduate students can use to solve and analyse their own theoretical models.

Economic Modeling Using Artificial Intelligence Methods examines the application of artificial intelligence methods to model economic data. Traditionally, economic modeling has been modeled in the linear domain where the principles of superposition are valid. The application of artificial intelligence for economic modeling allows for a flexible multi-order non-linear modeling. In addition, game theory has largely been applied in economic modeling. However, the inherent limitation of game theory when dealing with many player games encourages the use of multi-agent systems for modeling economic

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phenomena. The artificial intelligence techniques used to model economic data include: multi-layer perceptron neural networks radial basis functions support vector machines rough sets genetic algorithm particle swarm optimization simulated annealing multi-agent system incremental learning fuzzy networks Signal processing techniques are explored to analyze economic data, and these techniques are the time domain methods, time-frequency domain methods and fractals dimension approaches. Interesting economic problems such as causality versus correlation, simulating the stock market, modeling and controlling inflation, option pricing, modeling economic growth as well as portfolio optimization are examined. The relationship between economic dependency and interstate conflict is explored, and knowledge on how economics is useful to foster peace – and vice versa – is investigated. Economic Modeling Using Artificial Intelligence Methods deals with the issue of causality in the non-linear domain and applies the automatic relevance determination, the evidence framework, Bayesian approach and Granger causality to understand causality and correlation. Economic Modeling Using Artificial Intelligence Methods makes an important contribution to the area of econometrics, and is a valuable source of reference for graduate students, researchers and financial practitioners.

"This book looks at an alternative approach to studying co-evolution of social networks and behaviour in social dilemmas that relies less on mathematical analysis, and instead uses computation methods to answer research questions"--

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The aim of this volume is to provide an introduction and selective overview of the rapidly emerging field of computational economics. Computational economics provides an important set of tools that an increasing number of economists will need to acquire in order to understand and do state-of-the-art research in virtually all areas of economics. Articles in the volume range from very applied, policy oriented applications of computational methods, to highly theoretical and mathematically complex analyses of algorithms and numerical methods. The book emphasizes the unique contributions of computational methods in economics, and focuses on problems for which well developed solutions are not already available from the literature in operations research, numerical methods, and computer science. As well as covering relatively mature areas in the field, a number of chapters are included which cover more speculative "frontier topics", in particular recently discovered computational innovations and research results. For more information on the Handbooks in Economics series, please see our homepage on <http://www.elsevier.nl/locate/hes>

Handbook of Computational Economics summarizes recent advances in economic thought, revealing some of the potential offered by modern computational methods. With computational power increasing in hardware and algorithms, many economists are closing the gap between economic practice and the frontiers of computational mathematics. In their efforts to accelerate the incorporation of computational power into mainstream research, contributors to this volume update the improvements in

algorithms that have sharpened econometric tools, solution methods for dynamic optimization and equilibrium models, and applications to public finance, macroeconomics, and auctions. They also cover the switch to massive parallelism in the creation of more powerful computers, with advances in the development of high-power and high-throughput computing. Much more can be done to expand the value of computational modeling in economics. In conjunction with volume one (1996) and volume two (2006), this volume offers a remarkable picture of the recent development of economics as a science as well as an exciting preview of its future potential. Samples different styles and approaches, reflecting the breadth of computational economics as practiced today Focuses on problems with few well-developed solutions in the literature of other disciplines Emphasizes the potential for increasing the value of computational modeling in economics.

The interest of physicists in economic and social questions is not new: for over four decades, we have witnessed the emergence of what is called nowadays “sociophysics” and “econophysics”, vigorous and challenging areas within the wider “Interdisciplinary Physics”. With tools borrowed from Statistical Physics and Complexity, this new area of study have already made important contributions, which in turn have fostered the development of novel theoretical foundations in Social Science and Economics, via mathematical approaches, agent-based modelling and numerical simulations. From these foundations, Computational Social Science has grown to incorporate as well the empirical component --aided by the recent data deluge from the Web 2.0 and 3.0--, closing in this way the experiment-theory cycle in the best

tradition of Physics.

Presenting a variety of computational methods used to solve dynamic problems in economics and finance, this book emphasizes practical numerical methods rather than mathematical proofs and focuses on techniques that apply directly to economic analyses. The examples are drawn from a wide range of subspecialties of economics and finance, with particular emphasis on problems in agricultural and resource economics, macroeconomics, and finance.

The aim of this volume is to provide deep insights and the latest scientific developments and trends in experimental economics. Derived from the 2015 Computational Methods in Experimental Economics (CMEE) conference, this book features papers containing research and analysis of economic experiments concerning research in such areas as management science, decision theory, game theory, marketing and political science. The goal is to present possibilities for using various computer methods in the scope of experimental economics to further provide researchers with a wide variety of tools. The field of experimental economics is rapidly evolving. Modern use of experimental economics requires the integration of knowledge in the domains of economic sciences, computer science, psychology, and neuroscience.

Recent research includes experiments conducted both in the laboratory and in the field, and the results are used for testing and a better understanding of economic theories. Researchers working in this field use mainly a set of well-established methods and computer tools that support the experiments. Methods such as artificial intelligence, computer simulation and computer graphics, however, are not represented enough in experimental economics studies and most experimenters do not consider their usage. The goal of the conference and the enclosed papers is to allow for an exchange of experiences and to promote joint initiatives to

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insight change in this trend.

The ability to conceptualize an economic problem verbally, to formulate it as a mathematical model, and then represent the mathematics in software so that the model can be solved on a computer is a crucial skill for economists. Computational Economics contains well-known models--and some brand-new ones--designed to help students move from verbal to mathematical to computational representations in economic modeling. The authors' focus, however, is not just on solving the models, but also on developing the ability to modify them to reflect one's interest and point of view. The result is a book that enables students to be creative in developing models that are relevant to the economic problems of their times. Unlike other computational economics textbooks, this book is organized around economic topics, among them macroeconomics, microeconomics, and finance. The authors employ various software systems--including MATLAB, Mathematica, GAMS, the nonlinear programming solver in Excel, and the database systems in Access--to enable students to use the most advantageous system. The book progresses from relatively simple models to more complex ones, and includes appendices on the ins and outs of running each program. The book is intended for use by advanced undergraduates and professional economists and even, as a first exposure to computational economics, by graduate students. Organized by economic topics Progresses from simple to more complex models Includes instructions on numerous software systems Encourages customization and creativity

Recent global anxiety indicates that more focus needs to be directed at economic issues related to industry. Conventional techniques often do not adequately embrace the integrated global factors that affect unique industries and industry focused computational tools have not

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been readily available. Until now. Computational Economic Analysis for Engineering and Industry presents direct computational tools, techniques, models, and approaches for economic analysis with a specific focus on industrial and engineering processes. Here are just a few of the topics you'll find: New economic analysis models and techniques Tent-shaped cash flows Industrial economic analysis Project-based economic measures Profit ratio analysis Equity break-even point Utility based analysis Project-balance analysis Customized ENGINEA software tool Engineering conversion factors The authors supply downloadable software, ENGINEA, that allows you to easily perform the various techniques outlined in the text, such as investment justification, breakeven analysis, and replacement analysis. Providing a high-level presentation of economic analysis of the unique aspects of industrial processes, they integrate mathematical models, optimization, computer analysis, and managerial decision processes. A comprehensive treatment of economic analysis considering the specific needs of industry, the book is a pragmatic alternative to conventional economic analysis books.

The series of international workshops on Agent-Based Approaches in Economic and Social Complex Systems (AESCS) is part of the worldwide activities on computational social and organizational sciences. The second workshop, AESCS '02, focusing on progress of agent-based simulation was held in Tokyo in August 2002. AESCS '02 explored the frontiers of the field. The importance of cumulative progress was emphasized in discussions of common tasks, standard computational models, replication and validation issues, and evaluation and verification criteria. Promoting multidisciplinary work in computational economics, organizational science, social dynamics, and complex systems, AESCS '02 brought together researchers from diverse fields. This book contains the invited papers by Robert Axtell, Shu-

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Heng Chen, and Takao Terano, along with selected papers collected in three major sections: Economic Systems, Marketing and Management, and Social Systems and Methodology. This essay examines the idea and potential of a computational approach to theory, ' discusses methodological issues raised by such computational methods, and outlines the problems associated with the dissemination of computational methods and the exposition of computational results. We argue that the study of a theory need not be confined to proving theorems, that current and future computer technologies create new possibilities for theoretical analysis, and that by resolving these issues we can create an intellectual atmosphere in which computational methods will make substantial contributions to economic analysis. Contemporary economists, when analyzing economic behavior of people, need to use the diversity of research methods and modern ways of discovering knowledge. The increasing popularity of using economic experiments requires the use of IT tools and quantitative methods that facilitate the analysis of the research material obtained as a result of the experiments and the formulation of correct conclusions. This proceedings volume presents problems in contemporary economics and provides innovative solutions using a range of quantitative and experimental tools. Featuring selected contributions presented at the 2018 Computational Methods in Experimental Economics Conference (CMEE 2018), this book provides a modern economic perspective on such important issues as: sustainable development, consumption, production, national wealth, the silver economy, behavioral finance, economic and non-economic factors determining the behavior of household members, consumer preferences, social campaigns, and neuromarketing. International case studies are also offered. The field of Computational Economics is a fast growing area. Due to the limitations in analytical

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modeling, more and more researchers apply numerical methods as a means of problem solving. In turn these quantitative results can be used to make qualitative statements. This volume of the Advanced Series in Theoretical and Applied Econometrics comprises a selected number of papers in the field of computational economics presented at the Annual Meeting of the Society Economic Dynamics and Control held in Minneapolis, June 1990. The volume covers ten papers dealing with computational issues in Econometrics, Economics and Optimization. The first five papers in these proceedings are dedicated to numerical issues in econometric estimation. The following three papers are concerned with computational issues in model solving and optimization. The last two papers highlight some numerical techniques for solving micro models. We are sure that Computational Economics will become an important new trend in Economics in the coming decade. Hopefully this volume can be one of the first contributions highlighting this new trend. The Editors H.M. Amman et al. (eds), Computational Economics and Econometrics, vii. © 1992 Kluwer Academic Publishers. PART ONE
ECONOMETRICS LIKELIHOOD EVALUATION FOR DYNAMIC LATENT VARIABLES 1
MODELS DAVID F. HENDRY Nuffield College, Oxford, U.K. and JEAN-FRANÇOIS RICHARD
ISDS, Pittsburgh University, Pittsburgh, PA, U.S.A.

"This book identifies the economic as well as financial problems that may be solved efficiently with computational methods and explains why those problems should best be solved with computational methods"--Provided by publisher.

This book is a compendium of Alok Bhargava's most important contributions in longitudinal econometric methods and its application to problems of food, nutrition and health. It demonstrates the usefulness of rigorous econometric and statistical methods in addressing

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issues of under-nutrition and poor child health in developing countries, as well as obesity in developed countries. The close connection between the issues and themes analyzed in disciplines such as economics, nutrition, psychology, demography, epidemiology and public health, provides a sound basis for the formulation of public policies.

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This book explores the exciting new field of Artificial Intelligence. It features in-depth coverage of important theoretical areas, including computational organization, computational economics, computational approaches in social science, and game theory. The concept of the multi-agent system is particularly attractive, as it promises autonomy based on the conceptual speciality of a rational agent as well as collective behavior through interactions. The book draws out themes, especially the ideas of connectivity and natural computation, that reveal deep, underlying similarities between phenomena that have formerly been treated as completely distinct. The idea of agent-based approach is particularly rich in fresh approaches applicable to many fields such as artificial intelligence, computational organization, computational economics, and computational game theory.

Computational Techniques for Modelling Learning in Economics offers a critical overview of the computational techniques that are frequently used for modelling learning in economics. It is a collection of papers, each of which focuses on a different way of modelling learning, including the techniques of evolutionary algorithms, genetic programming, neural networks, classifier systems, local interaction models, least squares learning, Bayesian learning, boundedly rational models and cognitive learning models. Each paper describes the technique it uses, gives an example of its applications, and discusses the advantages and disadvantages of the

technique. Hence, the book offers some guidance in the field of modelling learning in computation economics. In addition, the material contains state-of-the-art applications of the learning models in economic contexts such as the learning of preference, the study of bidding behaviour, the development of expectations, the analysis of economic growth, the learning in the repeated prisoner's dilemma, and the changes of cognitive models during economic transition. The work even includes innovative ways of modelling learning that are not common in the literature, for example the study of the decomposition of task or the modelling of cognitive learning.

The approach to many problems in economic analysis has changed drastically with the development and dissemination of new and more efficient computational techniques. *Computational Economic Systems: Models, Methods & Econometrics* presents a selection of papers illustrating the use of new computational methods and computing techniques to solve economic problems. Part I of the volume consists of papers which focus on modelling economic systems, presenting computational methods to investigate the evolution of behavior of economic agents, techniques to solve complex inventory models on a parallel computer and an original approach for the construction and solution of multicriteria models involving logical conditions. Contributions to Part II concern new computational approaches to economic problems. We find an application of wavelets to outlier detection. New estimation algorithms are presented, one concerning seemingly related regression models, a second one on nonlinear rational expectation models and a third one dealing with switching GARCH estimation. Three contributions contain original approaches for the solution of nonlinear rational expectation models.

