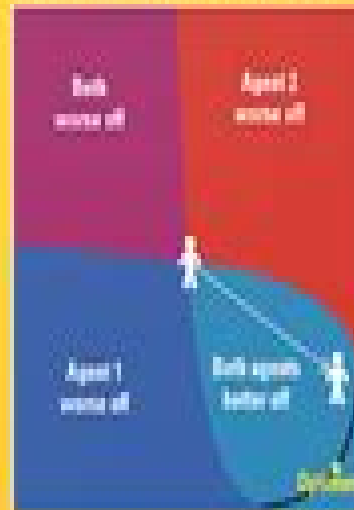


# Agent-Based Modelling in Economics

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*Agent-Based Modeling for Archaeology* Iza Romanowska, Colin D. Wren, Stefani A. Crabtree, 2021-08-02 To fully understand not only the past but also the trajectories of human societies we need a more dynamic view of human social systems Agent based modeling ABM which can create fine scale models of behavior over time and space may reveal important general patterns of human activity Agent Based Modeling for Archaeology is the first ABM textbook designed for researchers studying the human past Appropriate for scholars from archaeology the digital humanities and other social sciences this book offers novices and more experienced ABM researchers a modular approach to learning ABM and using it effectively Readers will find the necessary background discussion of modeling techniques and traps references and algorithms to use ABM in their own work They will also find engaging examples of how other scholars have applied ABM ranging from the study of the intercontinental migration pathways of early hominins to the weather crop population cycles of the American Southwest to the trade networks of Ancient Rome This textbook provides the foundations needed to simulate the complexity of past human societies offering researchers a richer understanding of the past and likely future of our species

**Economics with Heterogeneous Interacting Agents** Alessandro Caiani, Alberto Russo, Antonio Palestrini, Mauro Gallegati, 2016-09-21 This book offers a practical guide to Agent Based economic modeling adopting a learning by doing approach to help the reader master the fundamental tools needed to create and analyze Agent Based models After providing them with a basic toolkit for Agent Based modeling it present and discusses didactic models of real

financial and economic systems in detail While stressing the main features and advantages of the bottom up perspective inherent to this approach the book also highlights the logic and practical steps that characterize the model building procedure A detailed description of the underlying codes developed using R and C is also provided In addition each didactic model is accompanied by exercises and applications designed to promote active learning on the part of the reader Following the same approach the book also presents several complementary tools required for the analysis and validation of the models such as sensitivity experiments calibration exercises economic network and statistical distributions analysis By the end of the book the reader will have gained a deeper understanding of the Agent Based methodology and be prepared to use the fundamental techniques required to start developing their own economic models Accordingly Economics with Heterogeneous Interacting Agents will be of particular interest to graduate and postgraduate students as well as to academic institutions and lecturers interested in including an overview of the AB approach to economic modeling in their courses

**Agent-based Models of the Economy** R. Boero,M. Morini,M. Sonnessa,P. Terna,2015-06-16 Agent based models are tools that provide researchers in economic fields with unprecedented analytical capabilities This book describes the power of agent based models along their methodology and it provides several examples of applications spanning from public policy evaluation to financial markets      Agent-Based Models in Economics Domenico Delli Gatti,Giorgio Fagiolo,Mauro

Gallegati,2018-03-22 The first step by step introduction to the methodology of agent based models in economics their mathematical and statistical analysis and real world applications      *Agent-Based Computational Economics Using NetLogo* Romulus-Catalin Damaceanu,2013-02-01 Agent based Computational Economics using NetLogo explores how researchers can create use and implement multi agent computational models in Economics by using NetLogo software platform Problems of economic science can be solved using multi agent modelling MAM This technique uses a computer model to simulate the actions and interactions of autonomous entities in a network in order to analyze the effects on the entire economic system MAM combines elements of game theory complex systems emergence and evolutionary programming The Monte Carlo method is also used in this e book to introduce random elements The 11 models presented in this text simulate the simultaneous operations of several agents in an attempt to recreate and predict complex economic phenomena This e book explains the topic in a systematic manner starting with an introduction for readers followed subsequently by methodology and implementation using NetLogo The volume ends with conclusions based on the results of the experiments presented The e book is intended as a concise and vital resource for economists applied mathematicians social sciences scientists systems analysts operations researchers and numerical analysts      **Agent-based Models of the Economy** R. Boero,M. Morini,M. Sonnessa,P. Terna,2014-01-14 Agent based models are tools that provide researchers in economic fields with unprecedented analytical capabilities This book describes the power of agent based models along their methodology and it provides several examples of applications spanning from public policy evaluation to financial markets      Economics as an Agent-Based

Complex System H. Deguchi, 2011-06-28 In agent based modeling the focus is very much on agent based simulation as simulation is a very important tool for agent based modeling We also use agent based simulation in this book with a stress on the mathematical foundation of agent based modeling We introduce two original mathematical frameworks a theory of SLD Social Learning Dynamics and an axiomatic theory of economic exchange Exchange Algebra among agents Exchange algebra gives bottom up reconstruction of SNA System of National Accountings SLD provides the concept of indirect control of socio economic systems to manage structural change and its stability We also compare agent based simulation with gaming simulation and investigate the epistemological foundation of agent based modeling     Introduction to Agent-Based Economics Mauro Gallegati, Antonio Palestrini, Alberto Russo, 2017-08-03 Introduction to Agent Based Economics describes the principal elements of agent based computational economics ACE It illustrates ACE s theoretical foundations which are rooted in the application of the concept of complexity to the social sciences and it depicts its growth and development from a non linear out of equilibrium approach to a state of the art agent based macroeconomics The book helps readers gain a better understanding of the limits and perspectives of the ACE models and their capacity to reproduce economic phenomena and empirical patterns Reviews the literature of agent based computational economics Analyzes approaches to agents expectations Covers one of the few large macroeconomic agent based models the Modellaccio Illustrates both analytical and computational methodologies for producing tractable solutions of macro ACE models Describes diffusion and amplification mechanisms Depicts macroeconomic experiments related to ACE implementations     Agent-Based Modelling of Social Networks in Labour-Education Market System Alexander Tarvid, 2015-12-07 This book covers the modelling of human behaviour in the education and labour markets which due to their interdependency are viewed as one system Important factors influencing the decision making of individuals and firms in this system are discussed The role of social environment and networks is stressed The approach of agent based modelling is presented and compared with standard economic modelling and other simulation techniques in the context of modelling complex adaptive systems Practical questions in building agent based models of labour education market system with social networks are discussed These questions include modelling the structure of education system and agent behaviour there modelling and calibrating the labour market without and with firms generating the social network defining its behaviour and calibrating it and embedding the resulting system into a larger model     **Agent Based Models for Economic Policy Advice** Blake LeBaron, Peter Winker, 2016-11-21 This special issue of the Journal of Economics and Statistics is devoted to the use of agent based models for economic policy advice It presents a collection of research papers in different fields of applications Special emphasis is laid on discussing the potential and possible limitations of agent based models for economic policy advice The editorial provides an overview on the role of agent based modeling in economic policy referring also to the papers presented Furthermore it highlights the strength of the approach i e the explicit microfoundation and the modeling of heterogenous agents Finally we also report on

current limitations of the method with regard to economic policy advice and point at some areas deserving further research

### **Econophysics of Agent-Based Models** Frédéric Abergel, Hideaki Aoyama, Bikas K. Chakrabarti, Anirban

Chakraborti, Asim Ghosh, 2013-09-07 The primary goal of this book is to present the research findings and conclusions of physicists economists mathematicians and financial engineers working in the field of Econophysics who have undertaken agent based modelling comparison with empirical studies and related investigations Most standard economic models assume the existence of the representative agent who is perfectly rational and applies the utility maximization principle when taking action One reason for this is the desire to keep models mathematically tractable no tools are available to economists for solving non linear models of heterogeneous adaptive agents without explicit optimization In contrast multi agent models which originated from statistical physics considerations allow us to go beyond the prototype theories of traditional economics involving the representative agent This book is based on the Econophys Kolkata VII Workshop at which many such modelling efforts were presented In the book leading researchers in their fields report on their latest work consider recent developments and review the contemporary literature *Agent-Based Modelling* Giacomo Gallegati, Mauro Gallegati, Simone Landini, 2024-12-31 This Element works as non technical overview of Agent Based Modelling ABM a methodology which can be applied to economics as well as fields of natural and social sciences This Element presents the introductory notions and historical background of ABM as well as a general overview of the tools and characteristics of this kind of models with particular focus on more advanced topics like validation and sensitivity analysis Agent based simulations are an increasingly popular methodology which fits well with the purpose of studying problems of computational complexity in systems populated by heterogeneous interacting agents *Agent-Based Methods in Economics and Finance* Francesco Luna, Alessandro Perrone, 2002 This volume on financial and economic simulations in Swarm marks the continued progress by a group of researchers to incorporate agent based computer models as an important tool within their discipline Swarm promotes agent based computer models as a tool for the study of complex systems A common language is leading to the growth of user communities in specific areas of application Furthermore by providing an organizing framework to guide the development of more problem specific structures and by dealing with a whole range of issues that affect their fundamental correctness and their ability to be developed and reused Swarm has sought to make the use of agent based models a legitimate tool of scientific investigation that also meets the practical needs of investigators within a community Swarm's principal foundation is an object oriented representation of active agents interacting among themselves and with their environment To this base layer it adds its own structures to drive record and portrait the events that occur across this world The specific contents of any world however are up to the experimenter to provide either by building them from scratch or by tapping previous contributions This book is notable in assembling a rich array of such contributions which are significant in their own right but which can also be mined to extract the reusable elements in their respective areas of finance and

economics It also presents three interesting software additions with tutorials in the form of simple financial and economic applications A Swarm meta language closer to a natural language the use of internet augmented Swarm for experimental economics and a Swarm visual builder will meet the challenges launched by other agent based modelling competitors The Swarm community at large can benefit greatly from the lead that the growing field of computational economics is taking to address its own needs as represented by the

**Complex Agent-Based Models** Mauro Gallegati, 2018-09-19

This book offers a thorough introduction to the highly promising complex agent based approach to economics in which agent based models ABMs are used to represent economic systems as complex and evolving systems composed of heterogeneous agents of limited rationality who interact with each other generating the system's emergent properties in the process This approach represents a response to the limitations of the dominant theory in economics which does not consider the possibility of a major crisis and to the inability of dynamic stochastic general equilibrium theory to generate empirically falsifiable propositions In the new perspective the focus is on identifying the elements of instability rather than the triggering event As the theory of complexity demonstrates the interactions of heterogeneous agents produce non linearity this puts an end to the age of certainties With ABMs the methodology is from the bottom up The individual parameters and their distribution are estimated and then evaluated to verify whether aggregate regularities emerge on the whole In short not only micro but also meso and macro empirical validation are employed Moreover it shows that the mantra of growth should be supplanted by the concept of a growth Given its depth of coverage the book will enable students at the undergraduate and Master's level to gain a firm grasp of this important emerging approach This book is flower blossomed by one of the two greatest Italian economists Bruce Greenwald Columbia University The author's the ABM prophet's thoughts on economics have been at the forefront of the world Without a firm belief in and dedication to human society it is impossible to write such a book This is a work of high academic value which can help readers quickly understand the history and current situation of complex economic theory In particular we can understand the basic viewpoints academic status advantages and shortcomings of various schools of economic theory Jie Wu Guangzhou Milestone Software Co China

*Agent-based and Individual-based Modeling* Steven F. Railsback, Volker Grimm, 2012 Agent based modeling is a new technique for understanding how the dynamics of biological social and other complex systems arise from the characteristics and behaviors of the agents making up these systems This innovative textbook gives students and scientists the skills to design implement and analyze agent based models It starts with the fundamentals of modeling and provides an introduction to NetLogo an easy to use free and powerful software platform Nine chapters then each introduce an important modeling concept and show how to implement it using NetLogo The book goes on to present strategies for finding the right level of model complexity and developing theory for agent behavior and for analyzing and learning from models Agent Based and Individual Based Modeling features concise and accessible text numerous examples and exercises using small but scientific

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**Agent-based Modelling: a Methodology for Neo-Schumpeterian Economics** Andreas Pyka, Giorgio Fagiolo, 2005     *The Future of Agent-based Modelling* Matteo Richiardi, 2015     **Essays on the Foundation and Application of Agent-based Modeling in Economics** Margo W. Bergman, 2003     *Agent-Based Modeling* Norman Ehrentreich, 2007-10-25 This book reconciles the existence of technical trading with the Efficient Market Hypothesis By analyzing a well known agent based model the Santa Fe Institute Artificial Stock Market SFI ASM it finds that when selective forces are weak financial evolution cannot guarantee that only the fittest trading rules will survive Its main contribution lies in the application of standard results from population genetics which have widely been neglected in the agent based community



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