Interactive Macroeconomics

Stochastic Aggregate Dynamics with Heterogeneous and Interacting Agents

Corrado Di Guilmi • Simone Landini • Mauro Gallegati

Physics of Society: Econophysics and Sociophysics

One of the major topics in macroeconomic theory is the coordination mechanism through which a large number of agents exchange goods in decentralized economies. The mainstream theory of efficient markets fails to provide an internal coherent framework and rules out, by construction, the interaction among heterogeneous agents. A rigorous micro-foundation for macro models can overcome this limitation and provide more reliable policy prescriptions. This book develops an innovative approach to the analysis of agent based models. Interaction between heterogeneous agents is analytically modelled by means of stochastic dynamic aggregation techniques, based on the master equation approach.

This book offers a systematic and integrated treatment of original concepts and tools, together with applications, for creating an alternative micro-foundation framework for a widespread adoption among the profession and by graduate students. In order to make the material accessible to graduate students, every non-standard mathematical tool or concept is introduced with a suitable level of detail. All the logical passages and calculations are explicit in order to provide a self-contained treatment that does not require prior knowledge of the technical literature.

Corrado Di Guilmi is Senior Lecturer at the University of Technology Sydney. His research interests include agent-based modelling, complex system theory, and post-Keynesian economics.

Simone Landini is Researcher at IRES Piemonte, Turin. His research interests include mathematical methods for socioeconomic and regional sciences, political and financial economics, agent-based modelling and complex systems theory.

Mauro Gallegati is Professor of Advanced Macroeconomics at the Università Politecnica delle Marche, Ancona. His research interests include heterogeneous interacting agents, agrowth and business fluctuations, financial fragility and complexity.

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The book is divided into four parts: the first presents the stochastic aggregation and macro-dynamics inference methods, based on the stochastic evolution of the microeconomic units; the second applies these inferential techniques on macroeconomic agent-based models; the third provides conclusions and stimulates further developments; the last part contains technical appendices.

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Physics of Society: Econophysics and Sociophysics

This book series is aimed at introducing readers to the recent developments in physics inspired modelling of economic and social systems. Socio-economic systems are increasingly being identified as 'interacting many-body dynamical systems' very much similar to the physical systems, studied over several centuries now. Econophysics and sociophysics as interdisciplinary subjects view the dynamics of markets and society in general as those of physical systems. This will be a series of books written by eminent academicians, researchers and subject experts in the field of physics, mathematics, finance, sociology, management and economics.

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To my family and friends, for their support. In particular to my friend Massimo, who could write a follow up of this book for all the times that I talked to him about it.

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Alla mia famiglia, a mio cugino Stefano.
Agli amici, a Manfred.
SL.

Tra alti e bassi, la vita senza di te non mi appartiene.
MG

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