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REVIEW

Aoki, Masanao and H. Yoshikawa, Reconstructing Macroeconomics, A Perspective from Statistical Physics and Combinatorial Stochastic Processes, Cambridge Univ. Press, 2007

This is a most welcome treatment of stochastic dynamics in macro -economic models, and its significance for theoretical and applied economics. Professors Aoki and Yoshikawa have been writing new chapters for macroeconomic research and policy implications.

The authors build their new macroeconomics on the observation that the huge number of heterogneous agents act stochastically different based on individual insights, tastes, goals ... , thus it would make no sense to invoke the notion of ,representative agent'and then apply deterministic methods of economic dynamics to identify equilibria. This is a powerful argument. However, if a primary purpose of macroeconomic reasoning is normative rather than descriptive then, for example, under some rational expectation hypotheses, the statistics of laws of large numbers could conversely justify a representative rational agent (RRA) because the non-conforming agents would cancel each other roughly by some normal distribution if their number gets larger and larger. In an equilibrium type situation the RRA case may just be a stochastic equivalent of many stochastically interacting heterogeneous agents .Thus it appears that under some circumstances we have a multitude of statistical equilibria a subset of those being generated by a class of RRAs. On the other hand, beyond the confines of normative macroeconomics the authors' methodology is more general and more natural but essentially complementary to conventional macroeconomic theories.

The stochastic theory and tools directed towards economic dynamics have been well motivated in their application dimensions throughout though the reader is well advised to have some basic knowledge in probability and stochastic processes. Beyond this, the authors have provided a self-contained description of all necessary and relevant concepts of the modeling toolbox, including key stochastic dynamics concepts such as the Master Equation (the backward Kolmogorov-Chapman Equation), the Fokker Planck Equation, Jump Markov Processes , Random Partitions and Combinatorial Randomness.

The macro- economic subject areas proper concern the aggregate dynamics of a large (but finite) universe of randomly interacting (heterogeneous) agents i.e., agents of different types, converging to possibly multiple equilibria, or resulting in fluctuations around locally stable equilibria. The state space transition of the process is endogeneously determined by the value maximization of the agents. The underlying processes are characterized by jump Markov processes where clusters of agents by types could generate market disequilibria.

Specific points emerging in the application of real macroeconomics involve

(i) a broader concept of equilibrium in terms of a set of stochastic distributions akin the Boltzmann-Gibbs distribution in statistical physics giving rise to a reformulation of macro equilibria as differences in total factor productivities (TFP) across industries;

(ii) spccial features of behavioral macro-uncertainty (as in early phases of upward/ downward cycles) resulting in ,uncertainty traps' impacting the effectiveness of economic/monetary policies;

(iii) better explanations through econometric implementation of cycles induced by financial uncertainty than conventional neoclassical macro dynamics , (a critical macroeconomic issue of major economies in the early months of 2008),

Though, naturally, most models discussed would apply directly to macroeconomic domains , such as economic growth and business cycles, they are also useful for sector and industry specific considerations.
Interesting application areas include: (i) models of innovation/imitation processes and market shares, (ii) endogeneous growth modeling, (iii) product entry and exit , (iv) business cycle models, (v) stochastic fluctuations and search, (vi) dynamic clustering and spatial agglomeration processes, (vii)industry and market concentration, (viii) strategies of trading rules in financial markets.
Other areas of industrial, managerial , regional and urban economics could be fruitfully using tools of stochastic dynamics.

The book is warmly recommended for an advanced course in macroeconomics, as a professional reference to macroeconomic researchers or as a supplementary text in mathematical economics.

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