

Lorens Imhof



Academic career

1994	Diploma, RWTH Aachen
1997	Dr. rer. nat., RWTH Aachen
1998 - 2004	Assistant Professor of Statistics, RWTH Aachen
1999 - 2000	Postdoc, Stanford University, CA, USA
2003	Habilitation, RWTH Aachen
Since 2004	Associate Professor of Statistics, University of Bonn

Invited Lectures

2006	Evolutionary Game Dynamics, Banff, AB, Canada
2007	Workshop on Games, Madrid, Spain
2010	Conference on Theoretical and Empirical Population Genetics, Max Planck Institute for Evolutionary Biology, Plön
2013	Conference on Dynamics, Games and Science II, Lisbon, Portugal
2015	Workshop on Persistence of Population Models in Temporally Fluctuating Environments, CIB, EPFL Lausanne, Switzerland

Research profile

I am interested in stochastic models and their applications to economic problems. The focus of my work has been on dynamic models for evolution and learning in games [1, 4, 6, 9]. For example, in [4] we study the evolution of cooperation in a finite population subject to mutation and random migration between subpopulations. A second line of my research is concerned with the economic theory of incentives [5, 2]. I have worked on principal-agent models that include various stochastic components. The goal is to develop contracts that provide strong incentives for the agents, when there is uncertainty about, for example, the tasks to be carried out and about the abilities of the agents. Another part of my recent research deals with some questions in information theory. In [3] we study the capacity and achievable data rate in some Gaussian fading channels.

Much of my research on evolutionary game dynamics has focused on the long-run behavior and on equilibrium analysis. In the future I intend to examine the time scales on which evolution takes place. It has been observed in several specific examples that the time needed to reach a state close to equilibrium behavior can be very sensitive to small changes of the underlying game. In [1] we used a Lyapunov approach to determine for some relatively simple models whether a certain target state is reached quickly. I would like to extend these initial investigations to more complex dynamics. For example, such an extension could lead to new insights into equilibrium selection under dynamics for games with iterated dominant equilibria, where a goal state may or may not be reached quickly through several intermediate stages. Another promising area for useful extensions are dynamics in fluctuating environments, which have received a lot of attention recently.

Editorships

- Journal of Dynamics and Games, American Institute of Mathematical Sciences (since 2014)

Research Area G My contribution to research area G consists in the development and analysis of stochastic models that help to understand evolution and learning in populations that play games. Essential ingredients are concepts and results from non-cooperative game theory and the theory of stochastic processes, in particular stochastic differential equations and Markov chains.

Selected publications

- [1] Glenn Ellison, Drew Fudenberg, and Lorens A. Imhof. Fast convergence in evolutionary models: a lyapunov approach. *J. Econom. Theory*, 161:1–36, 2016.
- [2] L. Imhof and M. Kräkel. *ex post unbalanced tournaments*. *RAND Journal of Economics*, 47(1):73–98, 2016.
- [3] Meik Dörpinghaus, Norbert Gaffke, Lorens A. Imhof, and Rudolf Mathar. *A log-det inequality for random matrices*. *SIAM J. Matrix Anal. Appl.*, 36(3):1164–1179, 2015.
- [4] Yu-Ting Chen, Christoph Hauert, and Lorens A. Imhof. *Fixation times in deme structured, finite populations with rare migration*. *J. Stat. Phys.*, 156(4):739–759, 2014.
- [5] L. Imhof and M. Kräkel. *Bonus pools and the informativeness principle*. *European Economic Review*, 66:180–191, 2014.
- [6] Josef Hofbauer and Lorens A. Imhof. *Time averages, recurrence and transience in the stochastic replicator dynamics*. *Ann. Appl. Probab.*, 19(4):1347–1368, 2009.
- [7] Holger Dette and Lorens A. Imhof. *Uniform approximation of eigenvalues in laguerre and hermite beta-ensembles by roots of orthogonal polynomials*. *Trans. Amer. Math. Soc.*, 359(10):4999–5018, 2007.
- [8] L. Imhof and S. Walcher. *Exclusion and persistence in deterministic and stochastic chemostat models*. *J. Differential Equations*, 217(1):26–53, 2005.
- [9] Lorens A. Imhof. *The long-run behavior of the stochastic replicator dynamics*. *Ann. Appl. Probab.*, 15(1B):1019–1045, 2005.
- [10] Lorens A. Imhof. *Maximin designs for exponential growth models and heteroscedastic polynomial models*. *Ann. Statist.*, 29(2):561–576, 2001.