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Colloquium: Economics as a self-organized evolutionary system

Prof. Dr. Stefan Thurner

Santa Fe Institute
Medizinische Universität Wien

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Währinger Gürtel 18-20
1090 Wien

Abstract

We propose a simple model of evolution dynamics and demonstrate it in a framework of economic dynamics. New goods and services are endogenously produced through combinations of existing goods. As soon as new goods enter the market they may compete against already existing goods, in other words new products can have destructive effects on existing goods.

As a result of this competition existing goods may be driven out from the market - often causing cascades of secondary defects (Schumpeterian gales of destruction). The model leads to generic dynamics characterized by phases of relative economic stability followed by phases of massive restructuring of markets -- which could be interpreted as Schumpeterian business cycles. Model timeseries of product diversity and productivity reproduce several stylized facts of economics timeseries on long timescales such as GDP or business failures, including non-Gaussian fat tailed distributions, volatility clustering etc. The model is phrased in an open, non-equilibrium setup which can be understood as a self organized critical system. Its diversity dynamics can be understood by the time-varying topology of the active production networks.

Monday, December 14th, 2009
4:00 p.m. Presentation Room Lakeside Labs.

Prof. Dr. Stefan Thurner

Santa Fe Institute

Medizinische Universität Wien

Biography:

Education

- Habilitation (Theoretical Physics), Vienna University of Technology, 2001
- Dr.rer.soc.oec. (PhD in Financial Economics), University of Vienna, 2001 (honors)
- CCEFM program in finance 1998-2000
- Dr.techn. (PhD in Theoretical Physics), Vienna University of Technology, 1995 (honors)
- Magister rer.nat. (MS in Theoretical Physics), University of Vienna, 1993 (honors)

Career History

- External Professor at Santa Fe Institute (from July 2007)
- Fellow at the Collegium Budapest (from March 2007)
- Associate Professor at Medical University Vienna (2004-present)
- Associate Professor (a.o. Universit¨atsprofessor, tenure) at University of Vienna (2001-2004)
- Tenure track position (Universit¨atsassistent) at University of Vienna (1999-2001)
- Postdoctoral Position at Vienna University of Technology, Vienna (1998-1999)
- Member of NuHAG, Institute of Mathematics, University of Vienna (1997-present)
- Research Associate at Boston University, Boston (1996-1997)
- Postdoctoral Position at Humboldt University, Berlin (1996)
- Guest researcher at Columbia University, New York (1996)
- Guest researcher at Universidad de Zaragoza, Zaragoza, Spain (1995)
- Guest researcher at Columbia University, New York (1995)

Scientific Interests

- Complex Systems: (1) Bioinformatics (2) Network theory (3) Evolutionary processes (4) Entropy formulations (5) Fractal time series analysis
- Life Sciences: (1) Reconstruction of gene regulatory networks (2) Control and analysis of biological rhythms (3) Cell motility
- Numerical Mathematics: (1) Wavelet analysis (2) Diffusion processes (3) Fractal harmonic analysis
- Econophysics: (1) Stochastic calculus (2) Arbitrage pricing (3) Banking regulation
- Particle Physics: Topology of Quantum Gauge Fields

Publications/Patents

- About 100 publications in journals like Physical Review Letters, Physical Review D and E, Nuclear Physics B, J Quantitative Finance, Neuroimage, J Pathology, Europhysics Letters, Histochemical Cell Biology, Physica A, Applied Bioinformatics or Physical Letters. Publications cover quantum chromodynamics, statistical mechanics of complex systems, medical- and biophysics, network theory, stochastic processes, fractal timeseries, financial models
- Three patents pending

Conferences

- About 20 invited talks and lectures at international conferences and summer schools.
  About 100 talks at conferences, workshops and seminars