SOE 8: Economic Models I

Time: Tuesday 10:15–11:00 Location: GÖR 226

SOE 8.1 Tue 10:15 GÖR 226

A time-homogeneous system of money and antimoney in an agent-based multi good economy — •Julian Stein, Simon Lanzmich, and Dieter Braun — Systems Biophysics LMU

Financial crises appear through human history. One source of financial instability might be the creation of money, as the credit mechanism leads to non-local transfer of purchasing power [1]. Motivated by an analogy to particle physics, locality and time-homogeneity can be imposed on monetary systems. As a result, full reserve banking is implemented by a two-currency system of non-bank (money) and bank assets (antimoney) [2]. Payments are made by passing on money or receiving antimoney. A free floating exchange rate between non-bank assets and bank assets is established. Interestingly, credit creation is replaced in this monetary memory by a liquidity transfer that simultaneously transfers money and antimoney at a negotiated exchange rate. We want to study whether the problem of credit crunches is mitigated once a full time symmetry of the monetary system is maintained.

To compare the prevailing monetary system to the money-antimoney system, simulations in an agent-based random economy are performed. In the economy, households and firms apply different stochastic trading strategies to exchange goods (and liquidity) via a limit order book mechanism. The system's dynamics are studied with respect to price evolution and the agents' phase space distributions of the utility and monetary wealth, similar to recent studies [3,4].

[1] New J Phys 16, 033024 (2014), [2] Physica A 290, 491 (2001), [3] Rev ModPhys 81, 1703 (2009), [4] QFin 11.7, 991-1041 (2011)

SOE 8.2 Tue 10:30 GÖR 226

When does inequality freeze an economy? — Joao Pedro Jerico[1], Francois Landes[2], Isaac Perez Castillo[3], Matteo Marsili[2], and •Valerio Volpati[4] — [1]Departamento de Fisica General, Instituto de Fisica, Universidade de Sao Paulo, Brazil — [2]The Abdus Salam International Centre For Theoretical Physics (ICTP), Trieste, Italy — [3]Department of Complex Systems, Institute of Physics, UNAM, Mexico — [4]Institut de Physique Theorique, CEA, Gif-sur-Yvette, France

Inequality and its consequences are the subject of intense recent debate. Using a simplified model of the economy, we address the relation between inequality and liquidity, the latter understood as the frequency of economic exchanges. Assuming a Pareto distribution of wealth for the agents, that is consistent with empirical findings, we find an inverse relation between wealth inequality and overall liquidity. We show that an increase in the inequality of wealth results in an even sharper concentration of the liquid financial resources. This leads to a congestion of the flow of goods and the arrest of the economy when the Pareto exponent reaches one.

SOE 8.3 Tue 10:45 GÖR 226

Estimating a Hierarchy of Safetly Levels within Planetary Boundaries in a 3-dimensional Co-evolutionary Earh System Model — •Tim Kittel[1,2], Rebekka Koch[2], Jobst Heitzig[1], Guillaume Deffuant[3], Jean-Denis Mathias[3], and Jürgen Kurths[1,2,4] — [1]PIK Potsdam, Germany — [2]HU Berlin, Germany — [3]IRSTEA, Aubière, France — [4]University of Aberdeen, United Kingdom

In recent years, the Planetary Boundaries by Rockström et al. (2009), their superseding refinements by Steffen et al. (2015) and Social Foundations by Raworth (2012) have been under intensive investigation, particularly their interaction with each other. The framework on Topology of Sustainable Management (TSM) developed by Heitzig et al. (2016) demonstrated how a hierarchy of safety levels arises when taking the dynamics of the system and possible management options into account.

In this talk, we will present a 3-dimensional low-complexity co model of climate change, welfare growth and energy transformation which cannot be analyzed manually anymore needing the Saint-Pierre algorithm from viability input for the estimation of the safety levels.

The estimated current state face the so-called pressing lake dilemma, i.e. a decision between 2 qualitatively different pathways has to be made. One choice would be to avoid the transgression of the boundary but leading to a fossil-based economy where the growth has to be restricted all the time. The other choice would be to risk a temporary transgression of the boundaries but finally leading to a green economy.