SOE 17: Economic Models

Time: Thursday 9:30–11:00 Location: GÖR 226

SOE 17.1 Thu 9:30 GÖR 226

Duality and stationary distributions of wealth distribution models — •Pasquale Cirillo, Wioletta Ruszel, and Frank Redig — Delft Institute of Applied Mathematics, TU Delft, Delft, The Netherlands

We analyze a class of energy and wealth redistribution models, discussing their economic implications. We characterize their stationary measures and show that they have a discrete dual process. In particular we show that the wealth distribution model with a non-zero propensity to save can never have invariant product measures. We also introduce diffusion processes associated to the wealth distribution models by "instantaneous thermalization". The emergence of Paretian tails in the distribution of wealth is also analyzed.

SOE 17.2 Thu 9:45 GÖR 226

Behavioral and network origins of wealth inequality: insights from a virtual world — •Benedikt Fuchs[1] and Stefan Thurner[1,2,3] — [1]Section for Science of Complex Systems, Medical University of Vienna, Spitalgasse 23, A-1090, Austria — [2]Santa Fe Institute, 1399 Hyde Park Road, Santa Fe, NM 87501, USA — [3]International Institute for Applied Systems Analysis, Schlossplatz 1, A-2361 Laxenburg, Austria

Almost universally, wealth is not distributed evenly within societies or economies. Most studies of wealth distributions suffer from low resolution of the data, and connections to the behavioral origins of wealth inequalities could so far not be established. Here we present wealth data of an entire economy of the players in a massive multiplayer online game. This unique dataset contains every player's wealth at any instant, as well as all of her actions. When comparing the wealth distribution with data from real world economies, we find striking similarities. Comparing measures of inequality such as the Gini index and the exponent of the power law tail of the wealth distribution, we find that wealth is distributed slightly more equally in the game than in western countries. Considering individual behavioral factors, we observe that the wealthiest players are monopolists of certain goods. We find that wealthy players generally are active members in social groups and entertain many mutual friendships; they have few personal enemies, but show pronounced animosity towards public enemies.

SOE 17.3 Thu 10:00 GÖR 226

Econophysics in modeling of regional development — •Efim Ya. Frisman and Mikhail Yu. Khavinson — Russia, 679016 Jewish Autonomous Oblast,Birobidzhan, Sholom-Aleikhem St., 4

The presentation will reflect experiences in regional development modeling in the context of econophysics. We explore regional development in the near equilibrium state by simulating the dynamics of main production factors (labor and capital). Regional economy can be considered a set of independently developing economic branches. The regional dynamics near the equilibrium point is in accordance with the heat irradiation law. The growth points (i.e., large investment projects) are capable of pulling the economy out of stagnation (thermodynamic equilibrium). This model is applied to the economic development of the Jewish Autonomous Region in the Russian Far East. Currently, a large project on the construction of Kimkano-Sutarsky mining complex is being realized in the autonomy. We have calculated the model parameters on the basis of the data gathered from the Jewish Autonomous Region. We have also evaluated the displacement of equilibrium points and determined a general trajectory of economy branches in the region. This research was supported by the Russian Foundation for Humanities (Project no. 13-12-79001).

SOE 17.4 Thu 10:15 GÖR 226

When forecasting of youth employment becomes as complex as weather forecasting — •Mikhail Yu. Khavinson and Matvey P. Kulakov — Russia, 679016 Jewish Autonomous Oblast,Birobidzhan, Sholom-Aleikhem St., 4

Having used the econophysical approach, we propose to study a complex interaction of different age-group workers in the aspect of nonlinear dynamics. These interactions can be described by a system of nonlinear ordinary differential equations. By analogy with biophysical models, the interaction of different age-group workers can be categorized into the following: neutralism, partnership, competition, discrimination (ageism, in particular), and oppression. The model contains complex stochastic dynamics or chaos, such as 'the butterfly effect' in the Lorenz system, referred to weather forecasting. The model allows the evaluation of possibilities of controlling the level of employment among different age-group workers by affecting the bifurcation parameters. We present the results of model verification on the data of the Jewish Autonomous Region (Russian Far East). We observe damped oscillations of employment in the region. According to simulation results, these fluctuations can be periodic in case of recession in the socio-economic situation.

This research was supported by the Russian Foundation for Humanities (Project no. 13-12-79001).

SOE 17.5 Thu 10:30 GÖR 226

Merging agent-based models with stock-flow consistent modeling in economics — •Oliver Richters — Universität Oldenburg, Institut für Chemie und Biologie des Meeres, Theoretische Physik / Komplexe Systeme — Wissenschaftliche Arbeitsgruppe nachhaltiges Geld

Agent-based modeling (ABM) provides microfoundations for economic models where macroeconomic relations emerge from interacting agents. Micro behaviour can generate complex macro trends. Unfortunately, they are generally not in agreement with basic accounting identities. In contrast, stock-flow consistent models (SFC) are macro models that integrate all stocks and flows of an economy and explain their mechanics. They rely on double-accounting bookkeeping for capital stocks and transactions and behavioral equations for the transactions not determined by the accounting structure. SFC mainly deal with aggregates of the institutional sectors and are therefore not based on a micro perspective.

Combining both approaches as suggested by Dirk Bezemer and others may lead to a consistent micro-foundation of macro behaviour and allows for a wide variety of models. After an insight in this emerging field, an application is given, studying the existence of an economic growth imperative in today's monetary system.

SOE 17.6 Thu 10:45 GÖR 226

G7 growth is bypassing the people — •Hans Danielmeyer and Thomas Martinetz — Institut für Neuro- und Bioinformatik, Uni Lübeck

The title identifies one of Paul Krugman's famous articles on socioeconomic mysteries. It was published in The NY Times years before the banking crash. We present its first theoretical proof and get perfect agreement with G7 data.

The absolute problem of macroeconomics is that it can only quantify supply since demand cannot be divided into added value chains. We solved it with symmetrical completion of variables and parameters for obtaining an equilibrium condition between supply and demand. The main costs are maintaining the technical infrastructure TI and law and order LO. Both increased since World War II from 8 to 20 % of the GDP, LO not least because the distribution of wealth (=TI) is nationally and internationally diverging. This doubles the cost of TI which is the driver of economic growth. The equilibrium condition shows that the rising cost of LO resulted in a flat maximum benefit for G7 people around 1985. This explains also why the weekly working time is increasing again after it had decreased from 96 hours per week in 1800 to a minimum of 35 hours around 1985.

Further consequences are just mentioned.