

SOE 4: Traffic, Urban and Regional Systems

Time: Monday 11:30–12:15

Location: H36

SOE 4.1 Mon 11:30 H36

Fluctuation analysis of German electricity power production: Comparison of classical and renewable sources — HYNEK LAVICKA¹ and JIRI KRACIK² — ¹Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Department of Physics, Břehová 7, CZ-11519 Prague 1, Czech Republic — ²Charles University in Prague, Faculty of Social Sciences, Institute of Economic Studies, Opletalova 26. CZ-11000 Prague 1, Czech Republic

We perform analysis of time series of electric power load production by type of power plant in Germany between 2010 and end of 2014. We report presence of 1/f noise with additional peaks for most of time series. Performing test statistics we obtain indication of presence of autocorrelations. Detailed analysis using MFDFA allowed to distribute electric power sources into three groups according to presence of type of autocorrelation. Solar, wind and gas power plants and other renewable energy sources exhibit anti-persistent behaviour while nuclear power plants, combined heat and power and Run-of-the-river hydroelectricity show persistent behaviour and finally, coal power plants mostly present uncorrelated behaviour. All sources share wide multi-fractal spectra of correlations while distribution multi-fractal spectrum is rather narrow and the distribution function deviates from Gaussian distribution.

SOE 4.2 Mon 11:45 H36

Risk modeling in Spanish indebted municipalities using Generalized Power Law distributions — FAUSTINO PRIETO and JOSÉ MARÍA SARABIA — University of Cantabria, Department of Economics, Santander, Spain.

In this paper, we studied how the debt is distributed across municipalities in Spain. These local entities are financed by the central state, by the autonomous community to which they belong, and by their local revenues. Their expenditure are directed at providing essential local services to people in their local area as, for example, street cleaning, local police, etc. For different reasons, they decide to contract debt. In that context, the aim of this study was to find an adequate probabilistic model for that debt. First, we found that the Power Law model was

only adequate in the upper tail of the distribution, which means that only the most indebted local entities followed a power law behaviour. Then, for all the Spanish indebted municipalities dataset, in the period 2008-2014, we fitted different probabilistic models by maximum likelihood, compared them by the Bayesian Information criterion, and found that a new Generalized Power Law (GPL) distribution provided the better fit. Finally, we tested the goodness-of-fit of that new GPL model by a Kolmogorov-Smirnov test method based on bootstrap resampling. We found that the new GPL distribution can be an adequate framework for modeling the debt of municipalities.

SOE 4.3 Mon 12:00 H36

Urban scaling observed in Japanese telephone book data — TAKAAKI OHNISHI^{1,2}, TAKAYUKI MIZUNO^{3,2}, CHIHIRO SHIMIZU², and TSUTOMU WATANABE^{4,2} — ¹Graduate School of Information Science and Technology, The University of Tokyo, Tokyo, Japan — ²The Canon Institute for Global Studies, Tokyo, Japan — ³Information and Society Research Division, National Institute of Informatics, Tokyo, Japan — ⁴Graduate School of Economics, The University of Tokyo, Tokyo, Japan

How different urban properties (such as number of hospitals, shops, patents, and crimes) depend on city size? It has been demonstrated that most urban properties Y follow the allometric scaling law $Y \propto N^\beta$, where N and β are population size of a city and the scaling exponent. Urban infrastructure has been shown to scale sub-linearly ($\beta < 1$) reflecting large cities don't need large infrastructure, whereas output and income have been shown to scale super-linearly ($\beta > 1$) reflecting high per capita in large cities. We empirically analyze urban scaling observed in Japanese telephone book data. This data are renewed every 4 months, offering comprehensive latest address info on nearly all shops, firms, hospitals, schools, parks, etc on a nationwide scale. These urban properties are divided into 332 categories depending on the urban role. This allows us to study and discuss systematically the scaling exponent that are associated with various aspects of urban properties. We show that obtained scaling exponents help to characterize urban properties.