Alternate entropy measure for assessing volatility in financial markets — Kay Hamacher¹ and Ranjan Bose² — ¹Department of Computer Science, Department of Physics & Department of Biology, Technische Universität Darmstadt, Germany — ²Department of Electrical Engineering, IIT Delhi, Hauz Khas, New Delhi, India

(Stock) market dynamics has become the ultimate challenge for our understanding of complex system dynamics. Thus, new ways to probe properties of the dynamics is an important step towards a better understanding - in particular, since simple pdfs were disregarded as the typical dynamics is governed by non-Gaussian fluctuations.

Here [1], we propose superinformation [2], which is a measure of the disorder of the entropy of general data sets. Besides obvious signals - such as the 2008 financial crisis - we were able to extract relations to volatility measures; an important quantity on which derivatives are traded. In particular, we observe correlations to the VIX index.

Going on step further, we introduce the super mutual information. Signatures were observed whose exploitation might be used to mitigate idiosyncratic risk.


From linearity to nonlinearity in commodity price analysis — Benedikt Gleich and Andreas Rathgeber — Institute of Materials Resource Management (MRM), University of Augsburg, Germany

In the field of minerals economics, the analysis of commodity prices using classical econometric approaches mostly incorporates linear models, in particular linear OLS (ordinary least squares) regressions. However, research on complex systems highly suggests nonlinear approaches and pure linearity could be a serious bias.

To compare linear and nonlinear methods, as a benchmark, we present a classical linear OLS regression analysis on price time series of 42 commodities (mostly industrial metals) and 11 common price factors like mining production or economic growth. While this linear approach frequently detects significant correlations, the effect of an independent variable in many cases is both positive as well as negative depending on the respective commodity. We argue that this variation is no result of fundamental (market) laws, but in fact comes from limitations of linearity. In contrast, we therefore evaluate and present a selection of alternative non-linear models and simulations, in particular using non-linear multi factor models and differential equation systems, which show an improved performance in explaining the real world relationship between commodity prices and common price factors.

Our results constitute an extension of current de facto standards in minerals economics and financial commodity price modeling, in particular by the utilization of non-linear models instead of linear OLS models. They enable a more realistic analysis of commodity price building.