No more tasty surprises: Calculating the probability of extreme events

September 26 2011

It had to happen: the property bubble burst and the global financial market experienced its biggest crisis in the last hundred years. In retrospect, many suspected it was coming, but nobody could have known for sure. The traditional investment strategy failed, as all forms of investment suddenly collapsed at the same time. In order to calculate the probability of several such extreme events occurring at the same time, three scientists at the RUB have developed a new method. Prof. Dr. Holger Dette, Dr. Axel Bücher und Dr. Stanislav Volgushev from the Institute of Statistics (Faculty of Mathematics at the Ruhr-Universität) published their findings in the prestigious scientific journal "The Annals of Statistics".

Big things start small

Up to now, when statisticians estimated the probabilities of extreme events, they usually calculated with dependencies between the outliers of statistical series. The outliers, however, make up the smallest part of a data set, e.g. the largest 100 out of 3,600 data. That means they ignore the dependencies of the bulk of the relevant data set, namely 3,500 data, and thus take the risk that important information is lost. Axel Bücher shows how this problem can be solved: "Our work provides a decision aid as to whether it is better to use the full range of data and not only the outliers. If all the data are relevant, then they should all be included. However, this is not always the case. Sometimes these data would falsify the result."

Multidimensional function

The researchers use the copula function for the evaluation. "This is a complicated, multi-dimensional function, which characterises stochastic dependencies between the data" explains Stanislav Volgushev. With this aid, a few years ago we might have noticed that many little termites were nibbling their way into the wooden foundation of the global financial market, whilst we were on the look out for large predators.

Financial crises as motivation for research

"Our research is strongly motivated by the recent financial crises. At that time, almost all the economic models and forecasting tools for loan losses failed because they did not pay sufficient attention to extreme dependencies. In the long run, we aim to develop models and methods that predict such events better" says Prof. Dette, explaining the reason for their research. For several years, the three researchers have been looking into new methods of asymptotic statistics which work with sample sizes approaching infinity. They are financed by the German Research Foundation (DFG) in the Collaborative Research Centre SFB 823 "Statistical modelling of nonlinear dynamic processes". The English-language publication bears the title "New estimators of the Pickands dependence function and a test for extreme-value dependence".

More information: Axel Bücher, Holger Dette, Stanislav Volgushev: "New estimators of the Pickands dependence function and a test for extreme-value dependence", in: "The Annals of Statistics", Volume 39, Number 4, 2011. doi: 10.1214/11-AOS890
projecteuclid.org/DPubS?verb=D … 14190620&page=record

Provided by Ruhr-University Bochum

Citation: No more tasty surprises: Calculating the probability of extreme events (2011, September 26) retrieved 10 April 2024 from https://phys.org/news/2011-09-tasty-probability-extreme-events.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.