AKSOE 2 Financial Markets and Risk Management I

Time: Monday 10:15–12:45   Room: BAR 205

AKSOE 2.1 Mon 10:15 BAR 205

Phase Transition Model of Catastrophe Insurance Claims — •Gordon Woo — RMS, 30 Monument Street, London, EC3R 8NB, UK

The evolution of catastrophe insurance modeling has been punctuated by major disasters that expose new loss phenomena, and promote improved understanding of unfamiliar extreme loss regimes. Hurricane Katrina in 2005 is such a disaster. The diversification of insurance risk within a large portfolio relies on sufficient randomness in individual loss experience. The diversification benefit is eroded if randomness transitions to a state of order, as may arise through a variety of disparate factors associated with the pattern of physical damage and the claims stochastic process. Physical damage factors include ancillary hazards, such as fire, flood and environmental pollution. Claims factors diminishing randomness include coarse collective loss adjusting procedures, demand surge arising from the bottlenecking of repairs, and legal and political intervention in the claims settlement process. Hurricane Katrina has demonstrated how the randomness structure of portfolio claims may be significantly altered in a super-catastrophe. This type of phase transition is studied theoretically from an econo-physics perspective, with a dynamical model being developed for local and global interactions.

AKSOE 2.2 Mon 10:45 BAR 205

The Multi-Fractal Model of Asset Returns: Its Estimation via GMM and its Use for Volatility Forecasting — •Thomas Lux — Department of Economics, University of Kiel, Olshausenstr. 40, 24118 Kiel

Multi-fractal processes have been proposed as a new formalism for modeling the time series of returns in finance. The major attraction of these processes is their ability to generate various degrees of long memory in different powers of returns - a feature that has been found to characterize virtually all financial prices. Furthermore, elementary variants of multi-fractal models are very parsimonious formalizations of the volatility dynamics as they essentially amount to one-parameter families of stochastic processes. The aim of this paper is to introduce a new and versatile estimation method for the causal multifractal of Calvet and Fisher (2001) and to use its parameter estimates in forecasting financial volatility. We use the auto-covariances of log increments of the multi-fractal process in order to estimate its parameters consistently via GMM (Generalized Method of Moment). Simulations show that this approach leads to essentially unbiased estimates, which also have much smaller root mean squared errors than those obtained from the traditional scaling approach. Our empirical estimates are used in out-of-sample forecasting of volatility for a number of important financial assets.

AKSOE 2.3 Mon 11:15 BAR 205

Risk bubbles and dynamic instability in multi-asset markets — •Matteo Marsili[1] and Giacomo Raffaelli[2] — [1]Abdus Salam ICTP, Trieste — [2]Univ. Roma "La Sapienza"

Portfolio theory maintains that investment should be diversified across assets in order to minimize risk. If investment has an impact on prices, it generates correlations between returns of assets, and hence modifies the risk measure which determines the optimal portfolio itself. Hence the correlations enter a feedback loop because they are generated by the very same strategies devised to exploit them. We introduce a simple phenomenological model which takes the impact of investment on the market explicitly into account. We show that the feedback on correlations gives rise to an instability when the impact of optimal portfolio investors exceeds a critical value. Close to the critical point, the model exhibits dynamical correlations very similar to those observed in real markets. Indeed fitting our model to real markets data, we find parameters close to the critical point. These results suggest that financial markets cannot be regarded as frictionless systems and that there is a limit to the amount of investment they are able to cope with.

(see arxiv.org/abs/physics/0508159)

AKSOE 2.4 Mon 11:45 BAR 205

Size matters: parametric non-universality in stock market data — •Zoltan Eisler[1] and Janos Kertesz[1,2] — [1]Department of Theoretical Physics, Budapest University of Technology and Economics, Budapest, Hungary — [2]Laboratory of Computational Engineering, Helsinki University of Technology, Espoo, Finland

A careful analysis of the high resolution data of New York Stock Exchange and NASDAQ reveals that many characteristics of a stock's trading activity depend monotonously on the capitalization of the underlying company. This applies to the means of traded value per minute and trading frequency. Moreover, the degree of persistence in these quantities is not universal among stocks: their Hurst exponent increases logarithmically with company size. A similar tendency is present in intertrade times, together with multiscaling. These findings indicate, that company size/capitalization acts as a continuous parameter that strongly influences the observed stylized facts.

AKSOE 2.5 Mon 12:15 BAR 205

Endogenous Price Formation: an universal mechanism in financial markets? — •Stefan Reimann — IEW University of Zurich Bluemlisaplstrasse 10 CH - 8006 Zurich

Stylized facts can be roughly divided into three classes: the existence and decay of the autocorrelation of powers of (log)-returns, the non-Gaussian character of the distributions of assets, particularly the presence of semi-heavy tails, and the multiscaling of asset returns. As a stylized model of price dynamics, we propose a multiplicative stochastic process with a price dependent stochastic growth rate. This feedback is due to endogenous price formation generated by demand. This simple model produces the stylized facts mentioned above. Hence it might be deduced that 1.) endogenous price formation is of universal importance on financial markets, while 2.) the stylized facts mentioned today provide too little structure for a more detailed explanation of market mechanisms.