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Statistical Analysis on the Convergence to the Heavy-Tailed Stationary Distribution of a GARCH Process

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Abstract

The aim of this thesis is to study the convergence to the stationary distribution of the time series model GARCH(1,1). This model is often used when modelling volatility and can be written in terms of a so-called stochastic recurrence equation. The main result when studying the solution of this equation, is that it obtains a distribution which is of power-law type or heavy-tailed. Performing simulation studies and applying methods from extreme value theory (EVT), the theoretical results regarding the stationary distribution of the process have been successfully verified. Moreover we study the time it takes for the distribution of the process to converge to a heavy-tailed distribution. The convergence appears to happen faster given high values of todays volatility. The stationary distribution of the process is obtained implementing numerical computations and it can be used to calculate risk measurements such as value-at-risk (VaR), which is of importance when assessing the magnitude of risk of extreme events in finance and insurance.

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