Institut für Ökonometrie und Statistik

Forschungsseminar

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Seminargebäude - S12

Harmonically Weighted Processes: A simple model to capture long memory

Abstract

The standard model to account for long memory in finance and economics is fractional integration of order d, where this memory parameter may take on any positive value. Fractional integration thus others an overwhelming flexibility in modelling persistence. This is a virtue and a burden at the same time: on the one hand, there is a high degree of flexibility in modelling long memory, but on the other hand the estimation of d is notoriously diffcult and troubled by large variance of slowly converging semiparametric estimators.

Here, we suggest an alternative model for long memory, which amounts to har- monically weighting short memory processes, $\sum_j x_{t-j}/(j + 1)$. A nonstandard rate of convergence is required to establish a Gaussian functional central limit theorem. Harmonically weighted processes do not allow - or require - to choose a memory pa- rameter. The admitted rigidity may turn out to be of practical advantage in applied work.

The harmonic inverse transformation removing this kind of long memory is also developed. We successfully apply the procedure to inflation series that have been modelled by fractional integration in the past, and we find that harmonically weighted processes may well be able to capture the long memory of inflation. We also study the asymptotic least squares theory when harmonically weighted processes are regressed on each other. While limiting normality of the sample aver- age requires the nonstandard normalization with $\sqrt{T}/\ln T$ (where T is the sample size), the regression estimators converge to Gaussian limits upon the conventional normalization with $\sqrt{T}$, and standard inference arises. Computer experiments sup- port the finite sample relevance of this limiting distribution theory.