

WILLIAM BENTER DISTINGUISHED LECTURE SERIES

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Liu Bie Ju Centre for Mathematical Sciences

City University of Hong Kong

Convergence Rate of Law of Large Numbers (LLN) and Central Limit Theorem (CLT) with Uncertainty of Probabilities

by

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Abstract

How to quantitatively measure the complicated and highly dynamical risks in financial markets is a longtime challenging problem in theory and practice. The main problem is that although we have a huge and increasing size of financial data, but, it is, in principle, impossible to find or to approximate the 'true probability' hidden behind the data. Our LLN and CLT in nonlinear expectation theory provide powerful tools to robustly quantify financial risks under the realistic assumption of the above uncertainty of probabilities and probability distributions. But in order to apply these theoretical result into practical quantitative finance, it is crucially important to obtain the convergence rates of these limit theorems.

In this paper, we present recent results on the convergence rate of LLN and CLT and explain how to apply them in practice with a new type of maxmean algorithm. Since the uncertainty of such type, often called Knightian uncertainty or ambiguity are non-negligible in most practical cases, inside and outside of finance, this methodology and algorithm can be applied to a wide practical situation.

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