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Joint Seminar Organised by

HKU Business School and Department of Statistics & Actuarial Science

Structural Deep Learning in Financial Asset Pricing

by Professor Jianqing FAN

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Professor of Statistics
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4:30pm - 5:50pm

KK202, K.K. Leung Building, HKU

Abstract

We develop new financial economics theory guided structural nonparametric methods for estimating conditional asset pricing models using deep neural networks, by employing time-varying conditional information on alphas and betas carried by firm-specific characteristics. Contrary to many applications of neural networks in economics, we can open the “black box” of machine learning predictions by incorporating financial economics theory into the learning, and provide an economic interpretation of the successful predictions obtained from neural networks, by decomposing the neural predictors as risk-related and mispricing components. Our estimation method starts with period-by-period cross-sectional deep learning, followed by local PCAs to capture time-varying features such as latent factors of the model. We formally establish the asymptotic theory of the structural deep-learning estimators, which apply to both in-sample fit and out-of-sample predictions. We also illustrate the “double-descent-risk” phenomena associated with over-parametrized predictions, which justifies the use of over-fitting machine learning methods. (Joint with Tracy Ke, Yuan Liao, and Andreas Neuhierl)

About the speaker

Jianqing Fan, is a statistician, financial econometrician, and data scientist. He is Frederick L. Moore '18 Professor of Finance, Professor of Statistics, and Professor of Operations Research and Financial Engineering at the Princeton University where he chaired the department from 2012 to 2015. He is the winner of The 2000 COPSS Presidents' Award, Morningside Gold Medal for Applied Mathematics (2007), Guggenheim Fellow (2009), Pao-Lu Hsu Prize (2013), Guy Medal in Silver (2014), Noether Distinguished Scholar (2018), Le Cam Award and Lectures (2021) . He got elected to Academician from Academia Sinica (中央研究院院士) in 2012.

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