

Hong Kong - Singapore joint Seminar Series in Financial Mathematics/Engineering

Decarbonization of financial markets: a mean-field game approach

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Abstract

We build a model of a financial market where a large number of firms determine their dynamic emission strategies under climate transition risk in the presence of both green-minded and neutral investors. The firms aim to achieve a trade-off between financial and environmental performance, while interacting through the stochastic discount factor, determined in equilibrium by the investors' allocations. We formalize the problem in the setting of mean-field games and prove the existence and uniqueness of a Nash equilibrium for firms. We then present a convergent numerical algorithm for computing this equilibrium and illustrate the impact of climate transition risk and the presence of green-minded investors on the market decarbonization dynamics and share prices. We show that uncertainty about future climate risks and policies leads to higher overall emissions and higher spreads between share prices of green and brown companies. This effect is partially reversed in the presence of environmentally concerned investors, whose impact on the cost of capital spurs companies to reduce emissions. However, if future climate policies are uncertain, even a large fraction of green-minded investors is unable to bring down the emission curve: clear and predictable climate policies are an essential ingredient to allow green investors to decarbonize the economy. Joint work with Pierre Lavigne (Institut Louis Bachelier).

About the speaker

Peter Tankov is professor of quantitative finance at ENSAE, the French national school for statistics and economic administration, having previously worked at Université Paris Cité and Ecole Polytechnique. His current research interests include theory and applications of mean-field games, quantitative finance, energy finance, and green and sustainable finance. Peter is the author of over 50 research articles on these and other topics and of the widely read book, *Financial Modelling with Jump Processes*. He is the recipient of the 2016 Best Young Researcher in Finance award of the Europlace Institute of Finance and the principal investigator of several national grants. Peter is the scientific director of the Green and Sustainable Finance Research Program at Louis Bachelier Institute and member of editorial boards of the main quantitative finance journals: *Mathematical Finance* and *Finance and Stochastics*.

Date:

Thursday, March 2, 2023
(HK Time)

Time:

4:30–5:30 pm (HK Time)

Zoom link:

<https://hkust.zoom.us/j/91939675664?pwd=T29pL09XWXQrRkRINEJEZGFNamdnQT09>

Meeting ID:

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