



NITheCS COLLOQUIUM: A Gentle Quantitative Modelling Approach for Rough Crude Oil Prices

Dr Mesias Alfeus (Stellenbosch University)

Attend in person at the Neelsie Cinema* or online

*1st Floor The Neelsie, Langenhoven Student Centre, Stellenbosch University

Monday, 6 March 2023 | 16h00 – 17h00 SAST

---- Cheese and wine will be served after the event ----

ABSTRACT

This paper analyses the attributes and the significance of the roughness of oil market volatility. We employ unspanned stochastic volatility models driven by rough Brownian motions that yield semi-analytic prices for futures options entailing efficient calibration applications. In a simulation study we show that the semi-analytic pricing performs as well as a Monte-Carlo simulation but gives rise to an efficient calibration. We therefore were able to calibrate option prices written on oil futures and provide evidence of the roughness in oil volatility. Introducing just one additional parameter, the Hurst parameter, indicating the roughness of the volatility improves the calibration by almost a factor of 10. The calibrated option-implied Hurst parameter varies over time, but the entire set of parameters becomes more stable than in the non-rough case corresponding to a fixed Hurst parameter $\frac{1}{2}$. These results underscore the importance to model roughness of oil market volatility.

Based on joint work with Associate Professor Christina Nikitopoulos (University of Technology Sydney, Australia) and Professor Ludger Overbeck (University of Giessen, Germany).

BIOGRAPHY

Dr Mesias Alfeus is a Senior Lecturer in the department of Statistics and Actuarial Science at Stellenbosch University. He has a PhD in Quantitative Finance from the University of Technology Sydney (UTS) in Australia with a dissertation titled, 'Stochastic Modelling of New Phenomena in Financial Markets'. He is a Mathematician by training, with a BSc in Mathematics and Physics from the University of Namibia. He holds masters and honours degrees in Financial Mathematics, both with Cum Laude from Stellenbosch University. He also holds a long list of academic awards, and won the 2018 International Young Investigator Training Program (YITP) prize at the XIX Workshop on Quantitative Finance held at Roma Tre University in Italy.

Dr Alfeus has held an academic visiting position at the University of Padova in northern Italy. He previously worked as a Risk Analyst at Namibian Financial Institutions Supervisory Authority (NAMFISA), Research Associate at UTS Finance, Lecturer in Financial Mathematics at the University of Wollongong Australia, and AIFMRM Postdoctoral Research Fellowship at the University of Cape Town. His papers have been published in the most prestigious journals including Journal of Futures Markets, Financial Innovation, Journal of Economics Dynamics, and Control, and International Journal of Theoretical and Applied Finance. His current research interests focus on Computational and Mathematical Finance, more specifically in numerical methods for pricing of options and model calibration, including model empirical analysis.



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