Youssef Raad

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Profile

Mathematics-Economics last semester graduate student with a focus on quantitative finance with strong skills in modeling, programming, and analytical reasoning. Deep experience with stochastic processes, asset pricing, and optimization, supported by independently developed research and teaching experience. Seeking to apply my analytical edge and programming expertise in a fast-pacedy environment.

Education

- **M.Sc. in Mathematics-Economics**, University of Copenhagen   *2024 – 2026 (Expected)*
  Expected Thesis Defense: Feb 2026
  Specialization: One-Factor Short Rate Modeling & Markov-Regime-Switching
  Grade Average: 11.0

- **B.Sc. in Mathematics-Economics**, University of Copenhagen   *2020 – 2023*
  Focus in stochastic calculus, financial econometrics, and numerical methods

- **Roskilde Gymnasium**   *2016 – 2019*
  Mathematics A, Physics A, Chemistry B

Work Experience

- **Teaching Assistant**, University of Copenhagen   *2025*

  - Personally selected by Professor Rolf Poulsen for the graduate-level course: Continuous Time Finance 2.
  - Evaluated 45+ students across large assignments ($\sim$10–40 pages), under tight academic deadlines.
  - Delivered feedback on mathematical finance (hedging of currency risk, volatility, delta etc., Monte Carlo simulation, option price estimation) and stochastic calculus; addressed student inquiries on advanced asset pricing.

- **Substitute Teacher**, Hedegårdenes Skole   *2025*

  - Taught across subjects and age groups; maintained effective learning in dynamic environments. Demonstrated adaptability, structure, and communication under pressure.

- **Service Roles (Student Jobs)**, Fakta, Jem & Fix, FK Distribution   *2013 – 2016*

  - Built early work ethic, discipline, and responsibility from a young age.

Projects

Thesis Preparation Project: Regime-Switching CIR with ARHMM

- Developed a novel regime-switching extension of the one-factor short rate CIR model using autoregressive hidden Markov methods.

- Engineered full estimation routines in `R` and `Python` independently — over 10000 lines of code — to handle direct maximization of the likelihood function.

- Applied the newly developed CIR model extended via a hidden Markov model to U.S. 3-Month Treasury Bill data ($\sim$10000 obsaervations), interpreting output through both statistical diagnostics and financial implications.

- Packaged the code as an open-source library with GitHub CI/CD and a 80-page technical write-up on the research into combining one-factor short rate models with autoregressive hidden Markov models. The code can be extended to any model where data has a transition or marginal density.

Seminar in Asset Prices and Financial Markets & Python Package: Heston Model Simulation

- Simulated stock prices paths via the Heston model using multiple discretization schemes (log-Euler, Milstein, QE, Broadie & Kaya: Drift Interpolated, etc.). These schemes discretize the variance and stock price paths.

- Implemented fast Fourier transform pricing methods for European options to find the exact risk neutral European time-0 call option contract price under the Heston model. As the integrals would have to be approximated, integration errors are also returned.

- Implemented a class in `Python` that estimates the risk neutral price of a European time-0 call option contract by Monte Carlo methods via a large number N of simulated stock price paths with standard errors, 99%-confidence band check, difference to the exact price and plots, returned.

- Packaged the code as an open-source library with GitHub CI/CD and a 30-page compact in depth write up on risk neutral pricing and estimation methods under the Heston model.

Project Outside of the Course Scope: Asset Allocation for Trust Fund

- Designed and back-tested multiple portfolio strategies (mean-variance, risk parity, momentum overlays, 60/40, value-weighted) with and without a leverage ut assuming no market frictions for simplicity.

- Investigated factor exposure across subperiods (Fama–French inspired). We examined the momentum factor performance.

- Provided investment strategy advice that aligned with fund preferences and operational constraints as investing is not an objective act, i.e. you can not invest without an opinion. Plots and Sharpe ratios were given.

Technical & Analytical Skills

- **Programming:** Python (Advanced), R (Advanced), LaTeX (Advanced), C/C++ (Basic)

- **Quant Finance:** Stochastic Calculus, Derivative Pricing, Time Series Analysis, Portfolio Theory, Asset Allocation, Statistical Extensions

- **Numerical Methods:** Monte Carlo, Optimization (BFGS, Nelder-Mead, etc.), Fourier Pricing, Discretization Schemes

- **Software:** Git, Excel (Advanced), Office Suite

Languages

- **Danish**: Native   **English**: Native   **Arabic**: Intermediate (Oral)