Filip Mellgren

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Education

PhD Student Economics 2021-
Stockholm University *Stockholm, Sweden*

MA Quantitative Economics/Finance 2019 – 2020
University of St.Gallen, GPA: 5.61/6.0 *St.Gallen, Switzerland*
Thesis (see below): *Tacit collusion with deep multi-agent reinforcement learning*

MSc Economics 2018 – 2020
Stockholm School of Economics, GPA: 4.60/5.0 *Stockholm, Sweden*
Note: *First part of a "double degree" program organized by SSE and HSG*

BSc Business & Economics 2015 – 2018
Stockholm School of Economics, GPA: 4.08/5.0 *Stockholm, Sweden*
Thesis: *Needles in a haystack: a machine learning approach to instrumental variable selection*

Additional coursework worth 133 ECTS 2014 – 2017
Universities of Gothenburg, Uppsala, & Stockholm *Online, and Gothenburg, Sweden*
Selected courses: Linear Algebra, Discrete Mathematics, Algorithms & Data Structures

Experience

Research Assistant September 2020-September 2021
University of St. Gallen & IIES, Stockholm University *Remotely*

I worked on two separate research projects with two distinct teams of researchers.

- In one project, I developed R-programs to analyze large sets of Swedish micro-level price data together with a team of macroeconomists researching price indices. A large part of the project was to understand the details of how inflation indices are calculated and understanding identification strategies relevant to estimating price elasticities.
- In the other project, I formed a more integral part of a research project related to analysing reinforcement learning based pricing algorithms. Tasks included reading research papers, suggesting research ideas, formulating testing benchmarks, analysing output from simulations, and discovering software bugs. See working paper below.

Data scientist/Product lead Part time 2019
Kodiak Rating *Stockholm, Sweden*

Kodiak is a SaaS start up with a data platform for procurement professionals. I was hired to be a "math savvy" person who could complement the company with knowledge in statistics and data analysis. Because the data pipeline was underdeveloped, I developed a data strategy and lead product development efforts toward a product that could generate useful data. I worked part time over the spring term and the summer and later gave some advice on product development from Switzerland during the fall. Note that I was contractually a data scientist but the work is better described as the product lead of a data product.

Skills

- **Programming languages**: R, Python, MATLAB, SQL, LaTeX
- **Spoken languages**: Swedish (native), English (C1), Spanish (∼B2)

Research projects

- **Working paper**: "Robust Algorithmic Collusion" is a working paper I started on as an RA, and more recently am working on as coauthor. We investigate economic consequences of Q-learning overfitting in pricing games and find that results are sensitive to changes in context. Link.
- **Master thesis**: I studied a deep multi-agent reinforcement learning pricing algorithm in a simulation to investigate whether the algorithm has the capacity to learn tit-for-tat (reciprocal) pricing strategies. Technologies used include Python, PyTorch, Jupyter notebooks, and cloud computing. Awarded with first prize in the Swedish Competition Authority's thesis competition, the highest grade at SSE, and the highest grade at HSG. Link.