Giorgio Costa

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PROFESSIONAL SUMMARY

Researcher Experience as a quantitative researcher in mathematical optimization, machine learning, and statistical analysis, with financial applications in data-driven decision-making models under uncertainty for intelligent asset management.

Quantitative Finance Demonstrated track record in the financial industry at the Toronto–Dominion Bank. Experience includes model development, backtesting, and successful model validation.

Developer Developed tractable financial models for asset allocation and risk management in Julia, R, Python, and MATLAB. These models use large financial data sets and are developed for both academic and professional applications.

Educator Experience as a lecturer at the University of Toronto, teaching advanced undergraduate courses in quantitative finance, statistics and probability.

EDUCATION

Sep 2015 – Present **Ph. D. Candidate in Operations Research**, University of Toronto
Advisor: Professor Roy H. Kwon
Thesis: Advances in risk parity portfolio optimization
GPA: 3.98 / 4.0

Sep 2007 – May 2012 **B. Eng. Hons. in Mechanical Engineering**, McGill University
Minor in Economics

PUBLICATIONS

Journal Publications

- **Costa, G.** and Kwon, R. H. (2020). A robust framework for risk parity portfolios. *Journal of Asset Management*, 21, 447–466.
- **Costa, G.** and Kwon, R. H. (2020). Generalized risk parity portfolio optimization: an ADMM approach. *Journal of Global Optimization*, 78, 207–238.
- **Costa, G.** and Kwon, R. H. (2020). A regime-switching factor model for mean–variance optimization. *Journal of Risk*, 22(4), 31–59.
- **Costa, G.** and Kwon, R. H. (2019). Risk parity portfolio optimization under a Markov regime-switching framework. *Quantitative Finance*, 19(3), 453–471.
- Wu, D., Kwon, R. H., and **Costa, G.** (2017). A constrained cluster-based approach for tracking the S&P 500 index. *International Journal of Production Economics*, 193, 222–243.
- Kheiri, M., Paidoussis, M. P., **Costa, G.**, and Amabili, M. (2014). Dynamics of a pipe conveying fluid flexibly restrained at the ends. *Journal of Fluids and Structures*, 49, 360–385.

Manuscript Preprints

- **Costa, G.** and Kwon, R. H. (2020). Data-driven distributionally robust risk parity portfolio optimization. Manuscript submitted for publication.

Conference Proceedings

- Kheiri, M., Paidoussis, M. P., and **Costa, G.** (2014). Dynamics of a Pipe Conveying Fluid Flexibly Supported at the Ends. *Proceedings of the ASME 2014 Pressure Vessels and Piping Conference. Volume 4: Fluid-Structure Interaction*. Anaheim, California, USA. July 2024, 2014.

PROFESSIONAL EXPERIENCE

Toronto–Dominion Bank, Toronto, ON

Oct 2017 – Sep 2018/ Oct 2016 – Mar 2017 — **Senior Risk Analyst**, TD Wealth – Credit and Market Risk

Received a Mitacs Accelerate research grant to develop a novel equity risk model that measures the propensity of a stock to suffer from price shocks. This model applies machine learning principles while retaining interpretability, and leverages large financial data sets. The development included feature selection and engineering, predictive model design, backtesting, and documentation. This model was successfully validated through the TD validation process. Other responsibilities included volatility surface re-calibration for option pricing, as well as general quantitative research of U.S. and Canadian equities.

Apr 2017 – Sep 2017 — **Research Associate**, TD Securities – Capital Markets Risk Management

TD Securities faced a problem modelling interest rate shocks under a negative rate environment. The proposed solution adapted peer-reviewed academic research into a tailored model that produced reasonable simulated shocks when interest rates approached near-zero and negative values. This allowed TD Bank to generate more realistic interest rate shock simulations using Monte Carlo methods to measure the 10-day Value-at-Risk of the Bank's portfolios. My responsibilities included research, model selection and adaptation to meet our requirements, coding and implementation, and backtesting.

Wood plc (formerly Amec Foster Wheeler plc), Oakville, ON

Sep 2014 – Aug 2015 — **Project Engineer-in-Training**

Project: Rainy River

Coordinated the preparation of deliverables between the engineering, scheduling, and cost control departments. These deliverables included technical drawings, calculations, and specifications. Evaluated equipment tender bids and provided technical recommendations.

Mar 2014 – Aug 2014 — **Field Engineer**, On-site at Buchanan, Liberia

Project: Liberia Western Range Iron Ore – Phase II

Performed project management duties for a large-scale construction project. Supervised construction and scheduling of project activities. Coordinated between the engineering and construction management teams.

Jul 2012 – Feb 2014 — **Mechanical Engineer-in-Training**

Projects: Liberia Western Range Iron Ore – Phase II, Belle Plaine, Copper Cliff

Prepared and checked engineering calculations and technical drawings. Prepared computational fluid-flow models and stress analysis of piping systems.

PROGRAMMING AND SOFTWARE

Programming	Julia, R, Python, HTML5/CSS3, LaTeX
Software	MATLAB, MS Office Suite
Optimization Tools	Gurobi, Mosek, Ipopt, CPLEX, SCS, JuMP, CVXPY
Cloud Computing	MS Azure, Docker

HONOURS AND AWARDS

Sep 2020 – Dec 2020 — **Ontario Graduate Scholarship**, Scholarship

Sep 2016 – Dec 2020 — **Dept. of Mechanical and Industrial Engineering**, Fellowship

Sep 2019 – Aug 2020 — **Ontario Graduate Scholarship**, Scholarship

Fall 2019 — **Dept. of Elec. & Comp. Engineering, Course Instructor Award**, Merit award

Sep 2018 – Aug 2019 — **Ontario Graduate Scholarship**, Scholarship

Sep 2017 – Aug 2018 — **Queen Elizabeth II Graduate Scholarship in Science and Technology**, Scholarship

Sep 2016 – Aug 2018 — **Mitacs Accelerate**, Research grant

Note: Received over $130,000 in scholarships and research grants.

TEACHING EXPERIENCE

Course Instructor (Lecturer)

Department of Mechanical and Industrial Engineering, University of Toronto

Fall 2020 — MIE236 – Probability

- Second-year undergraduate course; enrolment: 120 students
- Instructor rating: N/A (course ongoing)
- Prepared and delivered lectures. Updated the course curriculum. Managed a team of three teaching assistants.

Division of Engineering Science, University of Toronto

Winter 2018 – 2020 — MIE377 – Financial Optimization Models

- Third-year undergraduate course; enrolment: 25 students
- Instructor rating: 4.6 / 5.0
- Prepared and delivered lectures. Updated the course curriculum. Redesigned the course-work to emphasize practical applications with real financial data. Managed a team of two teaching assistants. Successfully underwent the Canadian Engineering Accreditation Board skills assessment process during the Winter 2018 term.

Department of Electrical and Computer Engineering, University of Toronto

Fall 2019 — ECE302 – Probability and Applications

- Third-year undergraduate course; enrolment: 100 students
- Instructor rating: 4.0 / 5.0
- Prepared and delivered lectures. Designed a new set of lecture notes. Managed a team of six teaching assistants.

Division of Engineering Science, University of Toronto

Fall 2018 — MIE375 – Financial Engineering

- Third-year undergraduate course; enrolment: 30 students
- Instructor rating: 4.5 / 5.0
- Prepared and delivered lectures. Updated the course curriculum. Managed the teaching assistant to ensure proper alignment between lectures and tutorials.

Teaching Assistant

Division of Engineering Science, University of Toronto

Fall 2019 – 2020 — MIE479 – Capstone Design Project

- Fourth-year undergraduate course; enrolment: 30 students
- Responsibilities included preparation and delivery of Python coding workshops and regular check-ins with the student teams to discuss model development.

Master of Mathematical Finance Program, University of Toronto

Summer 2017 – 2020 — MMF1921 – Operations Research

- Graduate course; enrolment: 30 students
- Responsibilities included preparation and delivery of tutorials, and preparation and grading of exams and assignments.

Fall 2017 – 2019 — MMF2000 – Risk Management

- Graduate course; enrolment: 30 students
- Responsibilities included grading of assignments and exams.

Department of Mechanical and Industrial Engineering, University of Toronto

Fall 2016 — MIE1621 – Non-Linear Optimization

- Graduate course; enrolment: 45 students
- Responsibilities included grading of assignments and exams.

PRESENTATIONS

- **Costa, G**. (November 2019). *Generalized Risk Parity Portfolio Optimization: An ADMM Approach*. CASCON x EVOKE, IBM annual academic and research conference. Markham, ON.
- **Costa, G**. (May 2019). *Generalized Risk Parity Portfolio Optimization: An ADMM Approach*. CORS Annual Conference. Saskatoon, SK.
- **Costa, G**. (November 2018). *A Regime-Switching Framework for Portfolio Optimization*. Fourth Industrial-Academic Workshop on Optimization and Artificial Intelligence in Finance at The Fields Institute. Toronto, ON.
- **Costa, G**. (January 2018). *Hidden Markov Model for Risk Parity Optimization*. Master of Mathematical Finance Symposium 2018. Blue Mountain, ON.

MENTORSHIP AND ACADEMIC SERVICE

Student Supervision

Sep 2019 – Apr 2020	Yu Zhang (undergraduate student, co-supervised with Prof. Roy H. Kwon) *Thesis*: Financial fundamental factors: A comparative and data-driven approach.
Sep 2019 – Apr 2020	Yang Yang (undergraduate student, co-supervised with Prof. Roy H. Kwon) *Thesis*: A quantitative approach to build a predictive model of PE ratio for stocks using linear regression with logarithmic transformations.

Academic Service

Jul 2020 – Present	*Journal of Risk and Financial Management* Journal reviewer in mathematical optimization
Sep 2017 – Present	*The Engineering Economist Journal* Journal reviewer in mathematical optimization

Volunteer Tutor

Sep 2015 – Jun 2017	*Pathways to Education, Regent Park* High school mathematics and physics tutor in a priority-neighbourhood in Toronto

PROFESSIONAL AFFILIATIONS

Apr 2019 – Present	Student Member, Institute for Operations Research and Management Sciences (INFORMS)
Nov 2018 – Present	Student Member, Canadian Operations Research Society (CORS)
Aug 2012 – Present	Engineer-in-Training, Professional Engineers Ontario (PEO)