Brooke Fitzgerald

environmental economics : data science : public policy

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EDUCATION

Ph.D. Natural Resource Economics — *Colorado State University*
Department of Agricultural and Resource Economics — *(expected May 2028)*

B.A. Applied Math and Data Science — *Hampshire College*
Departments of Cognitive Science and Natural Science — *(awarded May 2018)*
Five College Certificate in Biomathematical Sciences

RESEARCH INTERESTS

Environmental and climate change, pollution, remote sensing, machine learning, causal inference for environmental justice and policy.

AWARDS

2023 and 2025 – CAS Best Graduate Poster Award in the Department of Agricultural and Natural Resource Economics

2018 – Lorna M. Petersen Prize for exemplary collaborative research

2017 – 5 College Statistics Award for best Hampshire College statistics student

WORKS IN PROGRESS

Is that Smoke in the Air? Estimating the Global Economic Cost of Smoke Exposure. With Jesse Burkhardt, Kimberly Corwin, Yawen Guan, Emily Fischer, and Jeffrey Pierce.

The Price of Staying In: Estimating Wildfire Smoke Avoidance Costs Using Comprehensive US Mobility and Spending Data. With Jude Bayham, Alexandra Hill, and Jesse Burkhardt.

Measurement of PM2.5 from Wildfire Smoke: Implications for econometric analyses with application to agricultural worker productivity. With Jesse Bukhardt, Alexandra Hill, and Jude Bayham.

PUBLICATIONS

2017 – **Fitzgerald, Brooke,** and Ashlie B. Flegel. Engine Icing Data-An Analytics Approach. No. GRC-E-DAA-TN40097. 2017. NASA Technical Report.

PROFESSIONAL EXPERIENCE

2020 - 2021 – Senior Data Scientist *Shopify, Montreal, QC*

Principal data scientist for the Shopify email project, responsible for:

- Processing billions of data records with PySpark to create modeled and interpretable datasets.
- Leveraging random forests and regression models to prevent fraud and predict customer engagement.
- Analyzing product effectiveness and impact using econometrics, bayesian and frequentist statistics, and digital experimentation.
- Communicating technical results with stakeholders to enable data-driven decision making at scale.

2018 - 2020 – Data Scientist *Shopify, Montreal, QC*

2017 – Data Science Intern *Shopify, Montreal, QC*

2016 – Machine Learning Intern *NASA Glenn Research Center, Berea, OH*

Improved speed and quality of NASA researchers' data analysis by creating a tool to automate and parallelize data processing and visualization.

PATENTS

Filed 2022 – Tate, Kyle Bruce, **Brooke Fitzgerald**, and Pascal Potvin. "Systems and methods for managing and controlling electronic messaging campaigns." U.S. Patent Application 16/930,916, filed January 20, 2022.

Issued 2022 – Sohn, Mary-Juen, **Brooke Fitzgerald**, and Tengke Xiong. "Systems and methods for controlling electronic message transmissions." U.S. Patent 11,368,422, issued June 21, 2022.

Issued 2022 – Clark, Kevin, **Brooke A. Fitzgerald**, David Cornu, Jacinthe Ricard, and Mathieu Leduc-hamel. "Systems and methods for dynamic messaging campaign." U.S. Patent 11,270,355, issued March 8, 2022.

CONFERENCE PRESENTATIONS

2025 – **Fitzgerald**, **Brooke,** Jesse Burkhardt, Yawen Guan, Kimberly Corwin, Jeffrey Pierce. Is that smoke in the air? Estimating the global cost of smoke plume exposure using machine learning. Track Session Presentation at 2025 AAEA annual meeting, Denver, CO, July 27-29.

2025 – **Fitzgerald**, **Brooke**, Jude Bayham, Ali Hill, Jesse Burkhardt. The Price of Staying In: Estimating Wildfire Smoke Avoidance Costs Using Comprehensive US Consumer Data. Selected Presentation at 2025 AERE Annual meeting, Santa Ana Pueblo, NM, July 28-30.

2025 – **Fitzgerald**, **Brooke,** Jesse Burkhardt, Yawen Guan, Kimberly Corwin, Jeffrey Pierce. Estimating the global cost of smoke plume exposure using machine learning. Selected Presentation at 2025 TWEEDS Conference, Portland, OR, April 25-26.

2024 – **Fitzgerald**, **Brooke**. The Price of Staying In: Estimating Wildfire Smoke Avoidance Costs Using Comprehensive US Consumer Data. Selected Presentation at 2024 AAEA annual meeting, New Orleans, LA, July 28-30.

2024 – Hoag, Dana, **Brooke Fitzgerald**, and Jane Stewart. Orchard disease management tool – Risk Management. Presented at the annual meeting of the Western Fruit and Horticultural Society, Grand Junction, CO, January.

2023 – **Fitzgerald**, **Brooke**, Dana Hoag, Jude Bayham, and Jane Stewart. Decision Making Under Uncertainty: Orchard Simulation Tool to Aid Treatment of Cytospora Canker. Selected Paper at the 2023 Joint CAES/SCAÉ -WAEA Meeting held in Whistler BC, July 17-20.

2023 – **Fitzgerald, Brooke**, Dana Hoag, and Jane Stewart. Orchard disease management tool. Presented at the annual meeting of the Western Fruit and Horticultural Society meetings, Grand Junction, CO, January.

2019 – **Fitzgerald, Brooke**, Dora Jambor, and Putra Manggala. Using Embeddings of Line Graph Powers to Retrieve Item Substitutes. Selected Presentation at Workshop on Deep Learning for Graphs at SIAM Conference on Data Mining. Workshop held in Calgary, AB on May 4.

SERVICE AND LEADERSHIP

2024 to Present – Graduate Liason for Women in Economics in the Department of Agricultural and Resource Economics (WE DARE).

2022 to Present– Student Representative in the Department of Agricultural and Resource Economics.

TEACHING EXPERIENCE

Colorado State University

2024 – Teaching Assistant, Course Material Creator for Graduate Course AREC 735: Econometrics II

2022 – Guest Lecturer, Teaching Assistant for AREC 345: Agricultural Policy

Hampshire College

2017 – Guest Lecturer, Teaching Assistant, Course Material Creator for Frontiers in Biomathematics

2017 – Guest Lecturer, Teaching Assistant for Introduction to Data Science

2015-2017 – Teaching Assistant for Calculus I & II, Dynamical Systems

TECHNICAL SKILLS

Programming Languages: Python, R, Stata, SQL, MATLAB, Java, Javascript, C++

Econometrics and Causal Inference: Diff-in-Diff, Synthetic Control, Causal Forests

Machine learning: Deep learning, unsupervised learning, tree-based methods

Big data analysis: Parallel and cloud computing, PySpark, Arrow, remote sensing

Software engineering: version control, web application development

LANGUAGES

Native: English | **Conversational:** Portuguese, Spanish | **Basic:** French