Florian Pothin

Ph.D. candidate in Economics: climate and environmental economics, carbon accounting, trade and embodied carbon, heterogeneous-firm macroeconomics

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Education

Ph.D. in Economics, Université de Rennes (CREM) 2023-2026

Industrial (CIFRE) doctorate in partnership with Toovalu. Thesis: *The Decarbonization Gap: Firms, Nations, and the Economics of the Low-Carbon Transition*. Defence: 24 November 2026, Rennes. The thesis crosses the scales of climate action one at a time (firm, nation and trade, then the firms that abate) and asks at each step what the number measures before asking whether it moves. Recurring finding: disclosure, pledges, income growth and trade policy move the appearance or the location of emissions more than their quantity; a carbon price cuts them, and its revenue allocation decides how much. Each empirical paper has a Zenodo replication package.

- Supervisors: Fabien Rondeau and Tovonony Razafindrabe. Committee: Hamza Bennani (Nantes Université) and Marc Baudry (Université Paris Nanterre), rapporteurs; Aude Pommeret (Université Savoie Mont Blanc), president; Katheline Schubert (Université Paris 1 Panthéon-Sorbonne).

M.Sc. in Financial and Economic Engineering, Université de Rennes (graduated with honours) 2018-2020

B.Sc. in Economics, Université de La Réunion 2015-2018

Summer school "Tools for Macroeconomics", London School of Economics 2025

Publications

Beyond Reported Emissions: Uncovering Hidden Corporate Carbon Footprints. *International Journal of Finance & Economics, forthcoming (accepted October 2026).*

With F. Rondeau, T. Razafindrabe and A. Macherey. CDP panel 2013-2023, fifteen Scope-3 categories: detects which categories firms omit or under-report and estimates the missing magnitude from credible reporters. The hidden part is 12.6-22.0% of reported emissions (81.7 Gt), concentrated in the use of sold products.

Working papers

Do Corporate Climate Pledges Cut Emissions? Science-Based Targets Change What Firms Count First. *submitted; Research Square preprint*.

Staggered difference-in-differences on SBTi firms linked to CDP (2015-2023). In the year after a pledge a firm discloses 6.7 percentage points more of the Scope-3 categories material to its sector; reported Scope 3 rises 41% while emissions within the pre-pledge category boundary fall 32%; Scope 1 shows no lasting change. The sign of the measured effect depends on a boundary the firm chooses.

Trade Shocks Redraw the Global Carbon Map but Do Not Shrink It. *under review*.

Embodied carbon on a trade network under sanctions, tariffs and WTO accession (PPML, staggered-adoption estimators). Russian carbon exports to the sanctioning bloc fall 31% then 74% and reappear in third countries. The trade elasticity estimated on an actual tariff (1.1-2.1) is far below the calibrated 4-6; at that value a border carbon adjustment cuts covered-sector embodied carbon by 2-4%, and a third to all of the cut leaks.

Is the Environmental Kuznets Curve Identified? Turning Points under Production-, Consumption- and Trade-Adjusted Life-Cycle Emissions. *submission in preparation*.

Strict identification criterion (bootstrap interval of the turning point inside the observed income support), size and power by Monte Carlo; parametric, semiparametric and neural estimators; replication audit of published neural-network turning points. No turning point identified for production- or consumption-based emissions; the life-cycle measure yields one, marginal and quadratic-only.

Endogenous Abatement as Green Capital in a Heterogeneous-Firm General Equilibrium. *with T. Razafindrabe; in preparation*.

Hopenhayn economy in which abatement is the green share of two irreversible capital stocks and emissions attach to the fuel that runs the dirty one. A 42% cut runs mostly through selection (dirty firms shrink and exit); an auction cuts emissions 57% where a rebate indexed on own emissions cuts nothing; the welfare premium of free allocation is an entry-scale distortion, not a climate effect.

Awards and projects

Prix Transition, Trophées Valorisation 2024, Campus Innovation, Université de Rennes Nov. 2024

Awarded to T. Razafindrabe, F. Rondeau and F. Pothin for the CREM-Toovalu research project behind the thesis.

ANR I-DAVE, research contributor (Toovalu side) 2024-2027

AI and knowledge-based framework for the reliability of life-cycle assessment, with Centrale Nantes (LS2N), UTC (Roberval),

Toovalu and Cetim: data harmonisation, emissions modelling, reliability assessment.

Presentations

- *International Economies: Challenges Ahead* (Ryukoku Univ. with Yokohama National Univ., Sciences Po Aix, AMSE), Kyoto, Feb.-Mar. 2026; research workshop, Shiga University, 2026 (trade shocks and embodied carbon).
- 11th International Macroeconomics Workshop, *International Macroeconomic Issues of Climate Change*, CREM, Rennes, 2025 (sectoral climate legislation).
- SESTEF 2024, Paris, Dec. 2024; FFM29, IPAG, Oxford, Sept. 2024 (hidden corporate carbon footprints).
- Practitioner talks: Produrable 2025 and 2026, Paris (footprint of AI); ADN Ouest and Boavizta, 2024 (spend-based emission factors).

Service and standards

- Member, Science Based Targets initiative Expert Working Group on Data Quality Assurance and Claims; member, IRIS-E (Université de Rennes), interdisciplinary research on the socio-ecological transition: evaluation of project proposals and funding decisions (from Dec. 2023).
- Pothin & Gilormini, *Multi-criteria environmental assessment of generative artificial intelligence services: a life-cycle-based method*, Zenodo, doi:10.5281/zenodo.22015676 (public methodological note).

Teaching

Macroeconometrics and Macrodynamics, M.Sc., Université de Rennes, 2023-2027 (≈120h). **Business and engineering schools**, 2022-2025 (≈150h): supervised machine learning in R (IA School), Python and AI frameworks (EPSI), mathematics for finance (IGEFI), green finance (IET). **Teaching assistant, Bloomberg Terminal sessions**, B.Sc. year 3 (European section, in English), Université de Rennes, 2018-2020 (≈30h per year). **Company tutor, tutored partner projects (P2T)**, first-year engineering students, Centrale Nantes, 2025 and 2026: two student teams, on low-carbon practices by sector, then decarbonisation levers in retail and agri-food.

Professional experience

Toovalu (Nantes), carbon-accounting software, Data scientist, Research & Impact Apr. 2022-Aug. 2026

CIFRE doctoral position; continued collaboration on applied research since Sept. 2026.

- Built the firm's emissions observatory (firm, sector and country level; CDP, ADEME, Bloomberg, EXIOBASE), whose sectoral-comparison module implements the correction framework of the first paper; production models for emissions estimation and Scope-3 gap filling in a B2B SaaS platform; internal lead on AI methods and on the footprint of AI.

Natixis Investment Managers (Paris), Quantitative research intern Mar. 2020-Jan. 2021

Return-prediction models for a multi-asset fund; ESG integration in portfolio construction. **CREM, Université de Rennes**, research assistant, Apr.-Aug. 2019: country-risk analyses for OPEC member states.

Skills and languages

Methods: heterogeneous-firm general equilibrium (value-function iteration, simulated-moments calibration); panel econometrics, staggered difference-in-differences, event studies, PPML, GMM/IV, bootstrap inference, power analysis. **Machine learning:** gradient boosting, random forests, regularised regression, neural and graph neural networks (scikit-learn, PyTorch, PyTorch Geometric). **Data:** CDP, SBTi, ADEME Base Empreinte, ecoinvent, EXIOBASE, BACI, Bloomberg, World Bank, OpenAlex; multi-source harmonisation, reproducible pipelines, Git, Zenodo. **Programming:** Python, R, MATLAB/Dynare, SQL, LaTeX. **Languages:** French (native), English (professional), German (basic), Japanese (A1).

References

Fabien Rondeau, Professor, Université de Rennes, CREM UMR CNRS 6211, fabien.rondeau@univ-rennes.fr | **Tovonony Razafindrabe**, Associate Professor (HDR), Université de Rennes, CREM UMR CNRS 6211, tovonony.razafindrabe@univ-rennes.fr