Patrick Rehill

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Primary supervisor: Nicholas Biddle (nicholas.biddle@anu.edu.au)

Research interests   Causal machine learning, econometrics, public policy

Education

Australian National University   Canberra, ACT
Centre for Social Research and Methods
PhD in Causal Machine Learning   Jan 2021 – Jan 2025 (submitted)

University of Melbourne   Melbourne, VIC
Graduate School of Humanities and Social Sciences
Master of Public Policy and Management   Mar 2017 – Dec 2018

University of Melbourne   Melbourne, VIC
Faculty of Arts
BA (Honours) in Politics and International Studies   Mar 2012 – Dec 2015
First class honours

Research experience

The Treasury (Australian Government)
Evaluation Analyst   May 2024 – Present
As an evaluation analyst at The Treasury's Australian Centre for Evaluation I run evaluations of programs across government. I run the Centre's program of quasi-experimental evaluations. I am currently leading evaluations on the Medicare Levy Surcharge / Private Health Insurance Rebate, and the Superannuation Work Test. This involves analysis of large, linked, whole-of-population administrative data. I am also involved in some of the Centre's randomised controlled trials. I am also seconded part-time to the Australian Government's AI CoLab which supports the development of AI tools for within government and for AI for good applications.

Australian National University
Research Officer   Mar 2021 – Present

As a research officer at the Centre for Social Research and Methods, I have specialised in quantitative social policy research, large administrative datasets and causal inference. Some projects have included:

- Research on Australia's COVID-19 vaccine roll-out.
- Designing analysis to study the effect of social and economic stressors in childhood on biomarker data later in life.
- Estimating the impact that electronic gaming machines (pokies) have on domestic violence with large administrative and geospatial data.
- An evaluation of a government housing program to help transitions from custody back into the community.

Independent consultant

Quantitative Research Consultant   Oct 2019 – Present

I run an independent consulting practice that conducts quantitative research for not-for-profits. My clients have included UNICEF, the International Womens Development Agency, Australian Enviornmental Grantmakers Network, and Australian Research Alliance for Children and Youth.

Australian Environmental Grantmakers Network

Research Officer   Jul 2018 – Dec 2020

I was a quantitative researcher at the AEGN where my projects focused largely on exercises to map the philanthropic ecosystem in Australia with a particular focus on climate change. I authored reports like the organisation's yearly Giving Trends report and a joint report with the Australian Department of Environment and Energy on giving to Registered Environmental Organisations.

Dandolo Partners

Research Analyst   Jul 2017 – Jun 2018

I was a graduate management consultant at Dandolo Partners, a boutique firm focused on public policy work for government and not-for-profit clients. My work tended to focus on the areas of start-ups, health, education and innovation. Some of my projects were:

- Writing a state government industry department's biotechnology strategy.
- Designing a major career education initiative for an Australian education department.
- Advising a large technology not-for-profit on how it should adapt in the face of serious challenges to its operating model.
- Mapping Victoria's startup ecosystem.

Teaching experience   **Sessional Academic, Centre for Social Research and Methods (ANU)**
Feb 2023, Feb 2024
SOCR8204 - Causal Inference (formerly Advanced Social Science Approaches to Inform Policy Development and Service Delivery)

I co-teach an intensive subject for Master of Applied Data Analytics students. The course covered causal inference from the perspective of public policy including experimental research, quasi-experimental research and causal machine learning approaches.

Teaching Associate, School of Social and Political Science (U.Melb)
Jul 2018 – Dec 2019
MULT30018: Applied research methods
I tutored a capstone subject for undergraduate social science students which taught quantitative research methods and SPSS.

Publications

Transparency challenges in policy evaluation with causal machine learning – improving usability and accountability
P. Rehill, N. Biddle.
Forthcoming in Data & Policy.

Policy learning for many outcomes of interest: Combining optimal policy trees with multi-objective Bayesian optimisation
P. Rehill, N. Biddle.
Journal of Computational Economics 2024

Working papers

Understanding the effect of stay-at-home orders on psychological distress during the COVID-19 pandemic: Evidence from a longitudinal study in Australia
P. Rehill, R. Barnes, N. Biddle, B. Edwards
In preparation.

Distilling interpretable causal trees from causal forests
P. Rehill
Submitted at Data Mining and Knowledge Discovery

How do applied researchers use the causal forest? A methodological review
P. Rehill
Submitted at International Statistical Review.

Causal machine learning in public policy evaluation — an application to the conditioning of cash transfers in Morocco
P. Rehill, N. Biddle.
Minor Revisions at the Data & Policy.

Fairness Implications of Heterogeneous Treatment Effect Estimation with Machine Learning Methods in Policy-making
P. Rehill, N. Biddle

Submitted at Philosophy & Technology.

In progress

The difference-in-differences and lagged outcome causal forests
P. Rehill

Reports

The relationship between COVID-19 policies and subjective wellbeing–August 2022 ANU Centre for Social Research and Methods
N. Biddle, B. Edwards, **P. Rehill**
ANU Centre for Social Research and Methods, 2022

Wellbeing outcomes in Australia as lockdowns ease and cases increase
N. Biddle, B. Edwards, M. Gray, **P. Rehill**
ANU Centre for Social Research and Methods, 2022

Mental health and wellbeing during the COVID-19 period in Australia
N. Biddle, M. Gray, **P. Rehill**
ANU Centre for Social Research and Methods, 2022

Variation in policy response to COVID-19 across Australian states and territories
B. Edwards, R. Barnes, **P. Rehill**, L. Ellen, , F. Zhong, A. Killigrew, ...
Blavatnik School of Government, University of Oxford, 2022

Gender insights in the Solomon Islands: Findings from a two-province study using the Individual Deprivation Measure
K. Fisk, C. McInerney, **P. Rehill**, J. Crawford, J. Pradela
International Womens Development Agency, 2021

Equality Insights and individual-level, gender-sensitive measurement of multidimensional poverty and inequality
J. Crawford, K. Fisk, J. Pradela, C. McInerney, C. Russell, **P. Rehill**
International Womens Development Agency, 2021

Non-traditional academic outputs

In Search of Lost Scroll
V. Rajan, **P. Rehill**, S. Limbrick, X. O'Connor
Melbourne Fringe Festival digital program, 2022

Talks and tutorials

Policy Learning for Many Outcomes of Interest: Combining Optimal Policy Trees with Multi-objective Bayesian Optimisation   Nov 2023
Causal Data Science Meeting

Psychological distress and lockdowns: Longitudinal evidence from ANU Poll and the Oxford University COVID-19 Government Response Tracker   Sep 2023

Australian Social Policy Conference

Making sense of causal machine learning models to uncover heterogeneous treatment effects   Mar 2023
CSIRO Data61 Causal and Explainable AI (CXAI) Seminar Series

Combining qualitative data and causal machine learning for better estimation   Nov 2022
8th Biennial ACSPRI Social Science Methodology Conference

Can domain knowledge priors improve causal machine learning estimates?   Nov 2022
Causal Data Science Meeting

<table>
<tr><td>Honors
and scholarships</td><td>Shortlisted: Freeplay Awards (Excellence in Micro-Games, Excellence in Experimental, Excellence in Emerging Developers)
In Search of Lost Scroll</td><td>2024</td></tr>
<tr><td></td><td>Shortlisted: International New Media Writing Prize
In Search of Lost Scroll</td><td>2023</td></tr>
<tr><td></td><td>Best Experimental (Melbourne Fringe Festival)
In Search of Lost Scroll</td><td>2022</td></tr>
<tr><td></td><td>Additional PhD funding (ANU Centre for Social Research and Methods)</td><td>2021</td></tr>
<tr><td></td><td>Research Training Program Scholarship (Australian Government)</td><td>2021</td></tr>
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Skills

Programming
Python (pandas, numpy, scikit-learn, EconML, matplotlib, TensorFlow, PyTorch, LangChain); R (tidyverse, Rcpp); SQL; C#; Julia; SPSS

Languages
English (fluent), Italian (proficient)