# Sarah Duffy

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## Research interests

Macroeconomics, Environmental Economics, Machine Learning

## Education

**University of Oxford** Oxford, UK
DPhil Economics 2022 – 2026
Supervisors: Professors Rick van der Ploeg and Andrea Ferrero

**University of Oxford** Oxford, UK
MPhil in Economics 2020 – 2022
Supervisor: Professor Rick van der Ploeg
*Grade: Distinction.*

**University of Oxford** Oxford, UK
BA Philosophy, Politics and Economics 2017 – 2020
*Grade: First Class*

## Working Papers

**Climate Change, Adaptation, and Sovereign Risk**
*In Progress.*
*Abstract:* Many heavily indebted economies are also highly exposed to natural disasters. As climate change makes these disasters more frequent and severe, the incentive to invest in adaptation to build resilience grows, but how does sovereign risk affect this motive? Using a novel measure of adaptation derived from government budgets I show that countries with lower sovereign ratings invest less in adaptive capital. Moreover, natural disasters increase the cost of borrowing for these countries. I embed these mechanisms in a sovereign default model showing that default risk could either increase or decrease optimal adaptation relative to a benchmark with perfect financial markets. Limited commitment tightens the budget constraint while also creating an additional incentive to adapt in order to reduce borrowing costs. For emerging market economies the first channel dominates and sovereign risk restricts adaptation. These economies suffer from an 'adaptation trap' dynamic: high borrowing costs restrict adaptation, leading to higher climate damages in the future which increase borrowing costs further. I conclude by showing that debt relief policies can be effective in improving climate resilience, sometimes at no cost to investors.

**Climate Policy Risk: A text-based approach**
*In Progress.*

*Abstract:* Shifts in climate policy stringency have heterogeneous effects on firms' profitability. Does the market price this risk? This paper provides new evidence on this question, utilising a supervised machine learning algorithm to construct a firm-level measure of climate policy risk exposure. Firms exposed to climate policy risk have negative abnormal returns on climate policy announcement days. I build a set of such dates and characterize abnormal return responses using *Risk Factors* discussions in 10-K filings. The algorithm uncovers predictors of policy risk exposure in the text which are used to construct an exposure score for each firm. This exposure score is correlated with emissions, environmental lobbying behaviour, and is predictive out of sample. Higher exposure is not associated with a premium. Green preference shifts are considered as a mechanism to rationalize this result. I find that empirically identified preference shocks can partly explain the lack of a climate policy risk premium.

**Carbon Border Adjustment Mechanisms with Heterogeneous Firms and Fixed Costs**
*In Progress.*

**Market Neutrality and Climate Non-Neutrality: the role for a Green QE**
*Abstract:* Tilting central bank asset purchases towards green bonds - Green QE - has been suggested as a way for central banks to mitigate their environmental impact while supporting the transition to a low carbon economy. I build a two sector E-DSGE model with financial frictions and imperfectly substitutable green and brown bonds to assess this proposal. The model is calibrated to the Euro Area at quarterly frequency, incorporating empirical findings on the brown tilt of the ECB portfolio under the status quo 'market neutrality' principle. Green QE is shown to achieve the same macro-stabilization outcomes as brown QE without the corresponding detrimental emissions. Moreover a shift in the ECB portfolio towards green bonds can lead to a substantial emissions decrease, at least in the short run. Turning to the question of transition risk, I show that a green QE rule can protect against the risk of a 'green recession' caused by a sudden, unexpected increase in the carbon price.

## Honors and scholarships

Department of Economics Scholarship (University of Oxford) 2024
Balliol-Oxford Economics Scholarship (Balliol College) 2022
James Hall Scholarship (Balliol College) 2019

## Teaching experience

**College Lecturer in Economics, University of Oxford** 2022-2023
Introduction to Macroeconomics, Macroeconomics, Introduction to Econometrics, Econometrics, Environmental Economics (All Undergraduate)

## Presentations and Summer Schools

LSE Environment Day 2023
MMF PhD Conference 2023

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| HEC Economics PhD Conference | 2023 |
| Chicago Booth Machine Learning in Economics Summer Institute | 2023 |
| EAERE annual conference | 2024 |
| IEA annual conference | 2024 |
| MMF annual conference | 2024 |

## Experience

**PhD Research Intern: Bank of England** 2024

Developed a heterogeneous firm trade model with climate policy to examine the potential macroeconomic effects of the Carbon Border Adjustment Mechanism.

**Research Assistant to Prof Andrea Ferrero** 2023

Provided Research Assistance on a project in international macroeconomics.

**Research Intern: Ofcom** 2021

Developed an economic framework to consider the effects of a climate change mandate on Ofcom's regulatory activities in the telecommunications sector.

## Skills and Other

**Programming**
Proficient in: R, MATLAB
Familiar with: STATA, Julia

**Citizenship:** Irish

**Peer Review:** Oxford Economic Papers

**Membership:** Royal Economic Society