Research Area and Approach

I am an economist focused on the interplay between environmental conditions, policies, and socio-economic outcomes. My objective is to deepen our understanding of these relationships to foster informed public policy and economic performance. My research pivots on two core themes, both exploring the nexus between the environment, policy, and economic outcomes:

The first theme, Economic Effects of Environmental Conditions, delves into the impact of air pollution on economic production. This is illustrated through my Job Market Paper on the causal effect of PM2.5 pollution on US GDP. My work also explores a theoretical framework of air pollution vulnerability and adaptation in high-income countries and the adaptation strategies of female-led enterprises in sub-Saharan Africa to climate change. Future work within this theme includes the development of a globally applicable instrument for air pollution exposure, and investigating the amenity value of weather.

The second theme, Evaluation of Environmental Policies is represented by two papers that look at the effects of Low Emission Zones in Europe. The first one looks at their effect in German cities' local production. The second one studies its effects on educational outcomes in London. Finally, a third paper delves into an EU regulation that enforced mandatory limits on air pollution across Europe, showing that it seems to have motivated strategic monitor positioning by local entities to evade fines. Through these themes, I aim to provide clear evidence of the complex interactions between environmental conditions, policies, and socio-economic outcomes, exploring how we can balance economic prosperity while caring for our environment. Now I will explain each theme in detail:

The Economic Effects of Environmental Conditions:
Current Work:

The most representative work in this category is my Job Market Paper, ***"The effect of air pollution on US aggregate production"***. In it, I focus on the effects of $PM_{2.5}$ particles on US GDP from 2006 to 2018. Utilizing a comprehensive dataset of yearly air pollution exposure at the county level, I employ a combination of fixed effects and instrumental variables to mitigate the challenges posed by reverse causality and measurement error. The instrumental variables exploit exogenous variations in air pollution levels, primarily deriving from wildfire-induced PM2.5 exposure, modelled with smoke plume polygons and air trajectory simulations.

While the overall effects on GDP, GDP per capita, and GDP per employee appear insignificant overall, a closer inspection reveals substantial negative effects in rural areas. These adverse effects are particularly clear during working days and when the base levels of air pollution are above the median. On a sectoral basis, the *"retail and wholesale"* and *"educational services"* sectors emerge as the most affected, with a respective 0.6% and 0.7% decrease in sectorial GDP per $\mu g/m^3$ increase in $PM_{2.5}$ concentration. Finally, the analysis enables a simple straightforward comparison of the estimated costs of the Clean Air Act and its benefits. This reveals that even if I only consider the Clean Air Act monetary, local and short-term benefits reflected in rural GDP (a clear lower bound), they still outweigh the associated compliance costs.

These insights are instrumental in understanding the magnitude and spatial and sectoral dimensions of air pollution's economic cost, thereby improving the understanding of the benefits of air pollution regulations such as the Clean Air Act.

In another co-authored work, I explore air pollution vulnerability and adaptation mechanisms in high-income countries, though a theoretical framework. This work aims to improve the conceptual understanding and empirical evidence surrounding this issue with a clear classification of the various socio-economic and psychological factors that drive adaptive behaviours. Finally, another collaborative research examines the adaptation strategies among female-led enterprises in sub-Saharan Africa to climate change.

Future Work:

Looking ahead, I have designed the structure and done most of the data work for two new projects. The first aims to develop a global air pollution instrument, precise in both spatial and temporal dimensions, leveraging distant wind currents to create random variation. This instrument has the potential to improve the quality and scope of environmental economic studies on air pollution globally.

The second project looks to quantify the amenity value of weather at different locations worldwide through revealed preferences, a first in estimating a crucial, global, and valuable environmental amenity. This will allow us to better understand human behaviour and the overall non-market costs of Climate Change.

Both projects come from a commitment to advancing the methodological frontier while engaging with relevant environmental economic issues. They reflect the use of sophisticated analytical tools and large datasets to understand complex environmental-economic interactions, ultimately aiming to provide empirical bases for informed policy decisions.

Evaluation of Environmental Policies

Two papers in this theme explore the effects of Low Emission Zones (LEZ). These are geographical areas with restricted access for highly polluting cars with the primary objective of reducing air pollution. More than 400 have implemented around Europe. In the Working Paper *"The effect of Low Emission Zones in local production: The case of German cities"*, I use the application of more than different 50 LEZ in Germany to explore its effects on local economic growth and structural change using a staggered diff-in-diff methodology with late-treated and never-treated cities as controls. The findings unveil that the application of LEZs reduced local GDP by 4.5% on average, predominantly due to declines in productivity and employment, while also shifting the local economy slightly away from industry towards public services and local commerce. Another paper (co-authored with Sefi Roth) investigates the effect of the London LEZ on educational outcomes, unearthing strong and positive impacts on children's test scores, particularly in low-income schools.

A third paper delves into an EU regulation that enforced mandatory limits on air pollution across Europe. With a discrete choice model of monitor station placement, I show that this regulation seems to motivate strategic monitor positioning by local entities to evade fines. Regions in attainment, and thus at risk of being penalised, are twice as likely to sit a monitor station on a relatively "clean" grid (1 SD lower air pollution levels than their surroundings). The results suggest that air pollution measurements might be endogenous to the attainment status of the zone.

In conclusion, my research explores the complex links between the environment, policies, and economic outcomes. Through detailed analysis using causal techniques, I aim to uncover how environmental factors and policies impact the economy to help inform better policy decisions. As I look ahead, my goal remains clear: to dig deeper into these issues, bring new insights to light, and contribute to building policies that support both economic growth and environmental care.