Research Statement

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My research leverages novel big data and causal inference methods to study how economic agents respond to environmental challenges and regulations. I focus on two broad areas. First, I examine how individuals adapt to environmental risks such as air pollution and natural disasters, quantifying behavioral responses that carry important economic and distributional consequences. Second, I analyze how firms strategically respond to environmental regulation and monitoring, revealing how policy design can influence compliance and enforcement. Together, these projects show that environmental shocks impose hidden economic costs, and both individual and firm responses can amplify or mitigate inequality in exposure and welfare.

Pollution and Economic Activity My job market paper, "Air Pollution and Economic Activity: Evidence from Foot Traffic Patterns", provides the first nationwide causal evidence on how pollution affects daily economic behavior. By linking large-scale smartphone-based foot traffic with satellite measures of PM2.5, I show that air pollution significantly reduces activity across a wide range of sectors, with the largest declines in entertainment and recreation.

These findings highlight an overlooked economic cost of pollution. Beyond its health impacts, pollution lowers economic output and well-being by changing people's daily activities. The responses are unequal: wealthier counties and those with larger child populations exhibit stronger reductions, suggesting heightened concern for vulnerable groups and underscoring how avoidance behavior can widen disparities in exposure and health. Together, the findings show that air pollution has broad and lasting economic impacts, adding to its costs and making equitable policy design more difficult.

Strategic Responses to Regulation My second paper, "Go with the Wind: Polluters' Strategic Response to Monitoring", shifts attention from individuals to firms, examining how coal-fired power plants respond to regulatory oversight. I show that plants increase emissions when monitoring is less effective, consistent with temporarily shutting down pollution control equipment. This strategic increase is larger for plants in non-attainment counties,

those monitored within the same state, and those in areas with few nearby polluters, suggesting that strategic responses are more likely when regulatory pressure is stronger and responsibility is easier to assign.

This behavior weakens the effectiveness of regulation and shifts the pollution burden onto different communities. More broadly, the paper shows how enforcement design and monitoring technology influence compliance, and how gaps in oversight can create unintended distributional consequences.

Additional Projects An ongoing coauthored project investigates how households adapt to wildfire smoke, focusing on the role of social networks in shaping defensive investments. We combine Nielsen retail scanner data on purchases of air purifiers and filters with daily wildfire smoke exposure and the Social Connectedness Index, a large-scale measure of social networks constructed from anonymized Facebook connections. This allows us to capture not only direct responses to local pollution but also indirect responses transmitted through social ties. As expected, households increase defensive purchases when locally exposed to smoke, but preliminary evidence suggests they also buy more protective goods when socially connected but geographically distant peers experience wildfire smoke. These findings underscore the role of social interactions in diffusing information about environmental risks and amplifying protective investments, providing new evidence that adaptation spreads through social networks as well as geography.

In another joint ongoing project, we examine forward-looking adaptation in agriculture, focusing on how Peruvian farmers respond to El Niño forecasts. Using detailed sowing-intentions surveys and satellite weather data, we explore whether farmers adjust their planting decisions when forecasts signal less favorable growing conditions. Preliminary evidence indicates that expectations can play a role in shaping production choices, suggesting forward-looking behavioral responses that may help mitigate losses from extreme weather. This project aims to contribute to the climate adaptation literature by studying how expectations can influence agricultural decisions in a vulnerable setting.

Finally, in another joint work, we study how the 1927 Great Mississippi Flood shaped the long-run occupational choices of children growing up in affected counties. Linking individuals across the 1920, 1930, and 1940 Censuses, we find that children from flooded areas were significantly less likely to become farmers. The effect is strongest for children from non-farming

families, who instead transitioned into the service sector. These shifts led to higher socioeconomic outcomes in adulthood, suggesting that natural disasters can accelerate structural transformation and improve mobility for some groups. This work connects environmental shocks to intergenerational mobility and the long-run evolution of the agricultural sector.

Future Research Building on my current research, I plan to continue exploring how environmental shocks create hidden economic and social costs often overlooked in policy design.

First, I plan to study how climate shocks disrupt daily economic life. As heat waves become more frequent and severe, I plan to use mobility and retail scanner data combined with high-frequency temperature measures to examine their effects on consumption and daily activity. This project aims to show how even routine climate shocks impose welfare costs that accumulate over time but rarely trigger formal relief.

Second, I plan to investigate how climate variability affects infrastructure reliability in hydropower-dependent countries of Latin America. In these settings, rainfall shortages directly cause power shortages, creating an additional channel through which climate shocks affect households. I plan to examine whether disruptions in electricity supply further harm health or labor outcomes by combining nighttime lights with household survey data. This project aims to show how climate variability can weaken critical infrastructure and amplify the human and economic costs of droughts.

Third, I plan to study how major trade shocks redistribute environmental externalities. The U.S.–China trade war introduced sudden tariff changes that shifted shipping activity across U.S. ports. I plan to examine how variation in exposure to Chinese tariffs affected shipping activity and, in turn, local air pollution and health risks. This project aims to ighlight how large policy shocks can reshape pollution burdens in hidden ways.