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HARVARD UNIVERSITY

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Education Harvard University
Ph.D. Economics, 2018 to 2024 (expected)
A.B. Economics, 2016

Fields *Primary:* Development, Environmental
Secondary: Behavioral, Economic History

References Professor Emily Breza (co-chair) ebreza@fas.harvard.edu
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Fellowships and Awards NBER Gender in the Economy Dissertation Fellowship, 2022-2023
National Science Foundation Graduate Student Research Fellowship, 2018-2023
Harvard University Certificate of Distinction in Teaching, 2020, 2021
John M. Olin Fellowship in Empirical Law and Finance, 2020

Teaching Gender Inequality Around the World (Undergraduate), Course Instructor, 2021
Behavioral Development Economics (Graduate), Teaching Fellow for Gautam Rao, 2021
Development Economics (Graduate), Teaching Fellow for Michael Kremer and Shawn Cole, 2020

Job Market Paper “[Learning About a Warming World: Attention and Adaptation in Agriculture](#)”

Abstract: Global warming threatens the livelihoods of 600 million low-income agricultural workers. I study how farmers learn about the environment and the consequences for climate change adaptation. Rice farmers in Bangladesh must form beliefs about their plot's soil salinity, a climate danger exacerbated by rising sea levels that can be mitigated by planting salinity-tolerant seeds. Comparing beliefs about salt levels to agronomic readings, I document both significant over- and underestimation of soil salinity across individuals. I explain this pattern using a conceptual framework of belief formation featuring an identification problem: farmers must learn about multiple unobserved environmental threats from ambiguous signals. As a result, farmers endogenously process data in support of their priors, e.g., someone worried about high salinity will interpret low yield as a sign of too much salt. Climate change amplifies this process by systematically altering the environmental risks farmers consider most threatening. I test and confirm the framework's predictions using a lab-in-the-field exercise and two natural experiments that isolate salient shocks that capture attention (e.g., tidal flooding) and subtle shifts that go unnoticed (e.g., irrigation water contamination through rising sea-levels). Despite equal effects on true salt levels, salient saltwater floods increase salinity beliefs substantially more than does subtle irrigation intrusion. These experiences shape how farmers interpret new data: past exposure to salient shocks increases the mental link between low yield and salinity while subtle shocks reduce the perceived diagnosticity of salinity clues. In large-scale field experiments, I show that correcting misperceptions significantly alters farmers' demand for salinity-tolerant seeds with substantial consequences for profits. I use this

experimental variation to estimate and validate a structural model of seed choice that allows me to simulate counterfactual policies and underscores the major economic impacts of environmental beliefs.

**Working Papers
and Work in
Progress**

Environmental

“Floods”

Abstract: Floods threaten a quarter of the world’s population, most of whom live in poor countries. How do floods impact economic development, and how do households adapt? To answer these questions, I first combine methods from geophysics and machine learning in the analysis of satellite data to detect inundation at a granular geographic level anywhere every day for the past two decades. Using this approach in Bangladesh, I find that floods cause a persistent decline in economic activity and force structural change by pushing employment out of agriculture, spurring migration, and shifting children into school. Places with recent exposure to floods experience less harm after subsequent inundation. Using a simple model of experience-driven adaptation, I derive empirical tests for two mechanisms underpinning this pattern and find evidence for both. In a survey of rural farmers, I first show that past flood exposure increases the perceived marginal benefit of adaptation investment by raising households’ beliefs about future disaster risk and damages. I next find that the marginal cost of coping with floods via temporary urban migration declines in inundation experience. Consistent with this “learning-by-doing” channel, reduced mobility frictions identified from quasi-random variation in Colonial-era transportation networks mediate the differential treatment effects of past flood exposure. Together, my results indicate that endogenous adaptation will significantly reduce the damage from future flooding.

“Risk Sharing and Adaptation to Environmental Threats”

Abstract: Informal insurance among neighbors provides an important way to smooth consumption in developing countries. How do environmental threats impact this equilibrium? I study how the spatial covariance typical of natural disasters and related dangers shape risk sharing in a dynamic limited commitment model. Households allocate economic activity between local and distant production and choose whether to participate in informal village risk sharing networks. The degree of local insurance depends on the relative riskiness of production outside the village. Higher spatial concentration of agricultural shocks can increase risk sharing when families self-insure by diversifying production within their household, ultimately making total earnings less correlated across neighbors. In a survey of Bangladeshi farmers, I find evidence of this complementarity: villages with more spatially covarying agricultural risk exhibit higher rates of temporary urban migration and stronger informal insurance networks.

“Beliefs and the Missing Market for Extreme Climate Insurance”

I examine the role of environmental beliefs in the failure of extreme climate insurance markets to materialize using data from rural Bangladesh on the joint distribution of perceived and true flood risk, expected damages, risk aversion, and demand for flood insurance contracts.

“Local Flooding Around the World”

I introduce a global database of daily flood exposure at a granular geographic level spanning two decades, built by using machine learning methods to expand the coverage of modern satellite technology.

Gender

“Marriage Markets and the Gender Pay Gap”

Abstract: Women with higher-paid husbands work less and earn less when they are employed. I build a multi-period model of the marriage market and subsequent spousal labor supply decisions to illustrate two potential channels underlying this fact: selection in the spousal match and treatment from partner type. Exploiting the sharp changes in the gender composition of college campuses in the U.S. around World War II, I isolate the treatment effect of the market for potential husbands. Women facing a dating pool with more college-educated men work and earn significantly less during

the next 30 years. Those who do enter the labor force ultimately work fewer hours and choose more flexible, lower paying occupations and industries.

“Women’s Mobility Barriers: Evidence from Delhi’s Free Public Transport Policy”, with Girija Borker and Gabriel Kreindler.

Abstract: Women’s mobility is severely restricted in many cities in developing countries. We study these constraints in the setting of a unique policy in Delhi, India that made public buses free for women citywide and added bus marshals on all buses. Using detailed panel survey data for a sample of women with low socio-economic status, we cannot detect an effect of the policy on mobility, despite a large citywide increase in female bus ridership and high policy awareness. In a randomized experiment before the citywide policy, we delivered a free one-month bus pass to women in the same sample. We find large effects on overall mobility that persist after the citywide policy is enacted and the bus pass becomes obsolete. These results are consistent with large individual-level frictions in mobility behavior that can be relaxed by a personalized intervention.

“The Bedrock of Gender Equality? The Legacy of Protective Legislation in Colonial India”

I trace the consequences of a colonial ban on female employment underground in Indian mines using new data on a century’s worth of women’s economic outcomes.

Human Capital

“What Jobs Come to Mind? Stereotypes about Fields of Study”, with John Conlon

Abstract: We document that US freshmen hold systematic misperceptions about the relationship between college majors and occupations. Students stereotype fields of study, greatly exaggerating the likelihood that majors lead to their distinctive jobs (e.g., counselor for psychology, journalist for journalism). In a field experiment, we find that reducing stereotyping has significant effects on students’ intentions about what to study and on the classes in which they later enroll. Finally, we present and empirically confirm additional predictions of a belief-formation model in which stereotyping arises from associative recall.

“A Rosetta Stone for Human Capital”, with Justin Sandefur

Abstract: Comparing human capital across different measures is a central challenge in many empirical economics settings, from quantifying local schools’ contribution to neighborhood effects to understanding the causes and consequences of global education gaps. Leveraging insights from item response theory with simple data collection, we develop a new methodology to non-parametrically translate performance measured across arbitrarily different scales. We implement this approach to link four of the world’s largest standardized tests using a hybrid exam we developed and administered to students in India and the United States. Armed with this learning “Rosetta Stone”, we apply our translations out of sample to microdata from 600,000 pupils across 80 countries and match their socio-economic status to moments of the global income distribution, establishing four new facts: (i) students with the same household income score significantly higher if they live in richer countries; (ii) the income-test score gradient is steeper in countries with greater income inequality; (iii) girls read better than boys at all incomes but only outperform them in mathematics at the lowest deciles of the global income distribution, and (iv) the test-score gap between public and private schools increases with inequality, partially due to a rise in socio-economic sorting across school types.

“Beliefs and Undermatching in College Applications”, with William Murdock

Abstract: Conditional on academic performance, low-income and minority students systematically apply to less selective colleges than their peers, a phenomenon known as “undermatching.” We examine the role of students’ beliefs in explaining this gap. We build a flexible model of application choice and elicit the individual parameters directly using a survey of American high school students. Equipped with students’ own valuations over college characteristics, beliefs about these attributes, perceptions of admissions chances conditional on applying, and budget constraints, we use integer

programming techniques to solve each student's optimization problem. Our model-delivered application portfolios closely match students' application choices. Counterfactual estimates using this structure show that differential beliefs about admissions probabilities across disadvantaged groups and application costs can explain a substantial share of undermatching. We conclude by simulating different policies to shed light on efficient levers to reduce inequality in higher education.

Publications

“Texts Don’t Nudge: An Adaptive Trial to Prevent the Spread of COVID-19 in India”, with Sebastian Bauhoff, Girija Bahety, and James Potter, *Journal of Development Economics*, 2021, vol. 153.

Abstract: We conduct an adaptive randomized controlled trial to evaluate the impact of a SMS-based information campaign on the adoption of social distancing and handwashing in rural Bihar, India, six months into the COVID-19 pandemic. We test 10 arms that vary in delivery timing and message framing, changing content to highlight gains or losses for either one’s own family or community. We identify the optimal treatment separately for each targeted behavior by adaptively allocating shares across arms over 10 experimental rounds using exploration sampling. Based on phone surveys with nearly 4,000 households and using several elicitation methods, we do not find evidence of impact on knowledge or adoption of preventive health behavior, and our confidence intervals cannot rule out positive effects as large as 5.5 percentage points, or 16%. Our results suggest that SMS-based information campaigns may have limited efficacy after the initial phase of a pandemic.

“The New Era of Unconditional Convergence”, with Justin Sandefur and Arvind Subramanian, *Journal of Development Economics*, 2021, vol. 152.

Abstract: The central fact that has motivated the empirics of economic growth—namely unconditional divergence—is no longer true and has not been so for decades. Across a range of data sources, poorer countries have in fact been catching up with richer ones, albeit slowly, since the mid-1990s. This new era of convergence does not stem primarily from growth moderation in the rich world but rather from accelerating growth in the developing world, which has simultaneously become remarkably less volatile and more persistent. Debates about a “middle-income trap” also appear anachronistic: middle-income countries have exhibited higher growth rates than all others since the mid-1980s.

Conferences

NEUDC 2019 (Northwestern), APPAM 2019 (Denver), ASSA 2020 (San Diego)

Academic Service

Reviewer for *American Economic Review: Insights*, *American Economic Journal: Economic Policy*, *Economics of Education Review*, *Higher Education*, *Journal of Applied Econometrics*, *Journal of Comparative Economics*, *Journal of Development Economics*, *Journal of Economic Growth*, *Journal of Human Resources*, *Journal of Political Economy*, *Journal of Urban Economics*, *PLOS One*, *Quarterly Journal of Economics*, *World Development*

Mentor for *Center for History and Economics Undergraduate Prize Fellowship*, *Harvard and MIT Application Assistance and Mentoring Program*, *Harvard Graduate Student Peer Mentoring Program*

Research Grants

National Science Foundation Dissertation Improvement Grant, 2023
Kenneth C. Griffin Economics Research Fund, 2023
Weiss Fund for Research in Development Economics (x3), 2019, 2020, 2023
Templeton Religion Trust Mini-Grant in Religion and Economic Development, 2023
Warburg Fund (x4), 2020, 2022, 2023
Harvard University Climate Change Solutions Fund, 2022
Chae Family Economics Research Fund, 2022
Institute for Humane Studies (x2), 2022, 2023
Mind, Brain and Behavior Initiative (x2), 2021
Harvard Mellon Urban Initiative Grant, 2021
Center for History and Economics – Paris, 2020
J-PAL South Asia at IFMR Cash Transfers for Child Health Initiative, 2020

Weatherhead Research Cluster on Comparative Inequality and Inclusion, 2020
CID/Weiner Center Award for Research in Inequality, 2020
Institute for Quantitative Social Science Grant, 2020
Foundations for Human Behavior Initiative (x2), 2020
Lab for Economic Applications and Policy (x2), 2018, 2019

Research Assistant Experience Claudia Goldin, Harvard University, 2017-2018
Center for Global Development, 2016-2017
Office of the Chief Economic Adviser, Government of India, 2015

Personal *Citizenship:* USA. *Birthplace:* Denver, Colorado. *Languages:* English, French (Basic)
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