

## Research Statement

I am a Labor and Development Economist. I explore policy-relevant national-level issues that affect economies around the world, such as the flow of migrants or the effects of nation-wide school building programs. I combine multiple analysis methods: a structural approach grounded in theoretical models to draw deeper insights into economic behavior; and a data-driven approach to causally estimate relationships. I apply these methods to a wide range of topics particularly related to migration, education, culture, development, firms, and crime/conflict.

I study diverse topics related to unequal educational access, migration and technology, firms around the world, and the interplay between regional development and criminal opportunities. The diversity in topics stems from my gravitating towards ever-changing policy-important questions. I enjoy the challenge of learning new sets of skills and literatures for each topic.

I examine fundamental issues affecting developing countries, such as the low levels of human capital, and large spatial disparities in opportunity that can be bridged by migration. In doing so, I identify fundamental roadblocks that policy can alleviate.

I focus on the causal effects of large-scale government initiatives, which, unlike smaller researcher-led interventions, come with specific challenges, such as economy-wide spillovers, imperfect implementation, and sporadic or poor-quality data. My approach to merging structural models with causal reduced-form approaches provides a comprehensive understanding of underlying changes to the economy. My research has already been cited at least 1341 times (as of September 2023), of which more than a thousand have been since 2019.

### How Education Affects Economic Development in India

One important aspect of my research agenda has focused on India's economic transition over the last three decades, where human capital accumulation has affected the broader economy.

In my sole-authored paper (in the *Journal of Political Economy*) "*Large-scale Education Reform in General Equilibrium: Regression Discontinuity Evidence from India*," I study the impact of one of the largest programs implemented by the Indian government in the 1990s. The policy incentivized school-age cohorts to attain more education, increasing their future earnings in the process. I develop a new general equilibrium model that captures the economic consequences of decisions made by households, private and public schools, and firms in the labor market. Importantly, I estimate the long-run returns to education in the presence of general equilibrium (GE) effects. I find that the program made skilled workers relatively more abundant, depressed their earnings in the labor market, and lowered the returns to education by one-third their original value. Furthermore, the GE effects have distributional consequences whereby skilled workers are better off and unskilled workers worse off. These results have substantial implications for

researchers who consider scaling up micro-interventions, and for policymakers who implement nationwide reforms, while the methods have widespread applicability.

Since the early 1990s, India has seen a narrowing of gaps in educational attainment across caste and gender. My sole-authored publication in the Review of Economics and Statistics, "*Does Affirmative Action Incentivize Schooling? Evidence from India*" shows that affirmative action policies that reserved a fixed proportion of government jobs for lower caste candidates successfully incentivized them to finish more years of schooling to become eligible for these jobs. While previous work examined earnings for minority groups who had benefitted from affirmative action in the past, no study directly addresses the impact on students still in school. I show that changing the economic returns to education by reserving high-paying government jobs can significantly affect a student's decision to stay in school, and help bridge disparities in educational attainment. The research has crucial implications for affirmative action policy in different parts of the world – not just in India, but also the US.

In other work, I study how building new universities in India can change the entire local market for lower levels of education. In "*The Effects of Elite Public Colleges on Primary and Secondary Schooling Markets in India*" (with Maulik Jagnani; in the Journal of Development Economics), we examine the general equilibrium effects on the market for secondary schooling. We find that an expansion in tertiary education actually incentivized the entry of private schools at the lower levels of education. Together, these papers study how access to education in India can result from large-scale policies with substantial general equilibrium consequences.

### Education for Migration: Brain Drain vs Brain Gain

The prospect of migrating and earning higher wages may drive educational attainment in low-income countries. In turn, the migrant income can be used for educating the next generation, and so on. My paper (reject and resubmit at the American Economic Review), "*The IT Boom and Other Unintended Consequences of Chasing the American Dream*" (with Nicolas Morales), shows how the US IT boom actually led to a structural transformation halfway across the world, in India. The internet-led boom in the US incentivized a large number of students in India to choose IT fields as specialties. Given the visa quotas and limited work periods in the United States, many of these students joined the labor pool for IT companies in India, creating a boom and driving economic growth in the country. We, therefore, addresses the debates between those who argue that foreign jobs drain the country's brightest minds and others who say that such jobs provide incentives for students to acquire skills that are valued in the global economy.

Other work digs deeper into the debate between brain drain and gain. "*Abundance from Abroad: Migrant Income and Long-run Economic Development*" (with Emir Murathanoglu, Caroline Theoharides, and Dean Yang), uses empirical tools as well as a structural model to show that income from international migrant labor allows families to invest in the education of younger cohorts, and in the long run, leads to substantial gains in economic development in origin areas. In the context of the Philippines, development and household income gains are driven by increases in education, and subsequently increased migration in high-skilled jobs.

The interaction between migration and skills is similarly important when studying within-country migration. In "*The Productivity Consequences of Pollution-induced Migration in China*" (revise and resubmit at the American Economic Journal: Applied Economics, with Wenquan Liang, Mushfiq Mobarak, and Ran Song), we document patterns in which skilled workers in China emigrate away from polluted cities, more than the unskilled. The paper contributes in showing that pollution changes the spatial distribution of skilled and unskilled workers. Indeed, some of the cities that skilled workers are emigrating from are where they would be most productive, lowering aggregate output. Using a spatial equilibrium model, we show that reducing pollution increases productivity through spatial re-sorting by approximately as much as the direct health benefits of clean air. These papers document how migration affects skill acquisition, which in turn, affects migration and the spatial distribution of economic activity.

### Migration for Education: from China to the US

While migration prospects may induce investments in education back home, migrating for education itself has greatly transformed the higher education sector in both sending countries like China, and receiving countries like the US. Annual international student flows to the US far outweigh the combination of all other categories of migration flows.

"*Trade Liberalization and Chinese Students in US Higher Education*" (forthcoming in the Review of Economics and Statistics, and co-authored with Kevin Shih, Ariel Weinberger, Mingzhi Xu, and Miaojie Yu), highlights how China's accession to the World Trade Organization fueled rapid income growth in Chinese cities. Growth in housing income/wealth allowed Chinese families to afford US tuition, and more students financed their studies using personal funds. We highlight a lesser-known consequence of China's global integration: the rise of US exports of higher-education services. Our estimates suggest that rising tensions and trade wars could cost US universities around \$1.1 bn in annual tuition revenue from Chinese nationals.

In fact, universities in the US have become increasingly reliant on students from abroad. The paper "*A Passage to America: University Funding and International Students*" (published in American Economic Journal: Economic Policy, and co-authored with John Bound, Breno Braga, and Sarah Turner), examines how international student flows from abroad allowed US universities to maintain quality despite large budgetary shocks. A flow of high-quality students from China and India, were an important source of revenue that helped public universities keep their doors open for local students, while still maintaining high levels of expenditure.

Given my work, my co-authors (John Bound, Breno Braga, and Sarah Turner) and I were invited to write a paper for the Journal of Economic Perspectives. The paper, "*The Globalization of Postsecondary Education: The Role of International Students in the US Higher Education System*," studies how international students have changed the US higher education landscape by providing much-needed resources for colleges, and a steady stream of high-ability skilled STEM students. This research also had a large impact on the research and policy community, and we were asked to contribute reviewed academic articles to many outlets. These include "*Public Universities: The Supply Side of Building a Skilled Workforce*" in The Russell Sage Foundation

Journal of the Social Sciences, which examines the consequences of large spending cuts to public universities, and "*Finishing Degrees and Finding Jobs*" in Innovation Policy and the Economy, which examines the pathways through which international students join the US labor market. Finally, I was invited by the National Academy of Sciences first to present my research, and then contribute an article to their Issues in Science and Technology, on "*How Higher Education Became an Important US Export*." These papers describe how the US higher education sector benefitted greatly from international student flows, allowing US colleges to maintain quality and expand access.

### How Migration Affects US Workers, Consumers and Companies

As a 'nation of immigrants,' the US economy has been greatly affected by immigration. This is particularly salient in the tech sector, where computer scientists from India have driven the US tech boom, changing our lives in many different ways.

In 2012, more than 60% of H1-B visas (for high-skilled immigrants) in the US were awarded to Indians. "*Recruitment of Foreigners in the Market for Computer Scientists in the US*" (co-authored with John Bound, Breno Braga, and Joe Golden; published in the Journal of Labor Economics) examined US immigration policy and how immigration from countries like India affects the earnings, consumption, and employment of US workers, as well as technological change and profits for US firms.

As a result of this research, I was invited to contribute articles in various academic outlets and book manuscripts. This includes "*Reservoir of Foreign Talent*" (in Science, with John Bound and Nicolas Morales), which argues how foreign workers help smooth business cycle fluctuations in labor demand. A book chapter in the volume "High-Skilled Migration to the United States and Its Economic Consequences" titled "*Understanding the Economic Impact of the H-1B Program on the US*" (also co-authored with John Bound and Nicolas Morales) builds a comprehensive general equilibrium model of the US to examine the welfare consequences of high-skill migrants for different types of workers and consumers. Along with my colleague, Munseob Lee, I was invited to write "*High-Skill Immigration, Innovation, and Creative Destruction*," a chapter in "The Role of Immigrants and Foreign Students in Science, Innovation, and Entrepreneurship," which uses a novel measure of innovation (that of new product varieties) to examine how immigration changes what products consumers have access to. More recently, I was invited to publish my article "*Better Migrant Rights Help Native Workers*" (co-authored with my student, Anna Brown) in the Journal of International Law and Foreign Affairs. This set of papers outlines how migration to the US had a widely-reaching impact on US workers, consumers, and firms.

### Production Networks and Supply Chains in India

While my research on US firms generates insights on how migration affects firm growth, in India, firms face substantial shocks to their production networks. The network structure has important implications not only for firm outcomes but for aggregate economic development.

In "*Supply Chain Resilience: Evidence from Indian Firms*" (under review, co-authored with Nicolas Morales and Nitya Pandalai-Nayar), we characterize the features that make supply chains more resilient. Using new data on firm-to-firm transactions from an Indian state, we identify firms with larger supplier risk following the Covid-19 lockdowns. Using an event-study design, we find firms with suppliers in strict-lockdown districts experienced substantially higher separation rates. Importantly, we find that firms that buy more complex products, with fewer available suppliers, are less likely to break links.

Indeed, the ease of shifting expenditures to alternative suppliers when faced with shocks determines how shocks propagate through the production network. In "*Production Networks and Firm-level Elasticities of Substitution*" (with Brian Fujjy and Devaki Ghose), we provide one of the first estimates of this elasticity of substitution across suppliers within the same product. Using new real-time administrative tax data on product-level prices and quantities with firm-to-firm transactions, and leveraging the geographic and temporal variation from the Covid-19 lockdowns in India, we find that suppliers are highly complementary even at this granular level, thus amplifying negative shocks by transmitting them through the supply chain. Protecting more connected firms mitigates output declines.

Finally, in countries like India, where there is low contract enforcement, production networks may rely on how culturally close the owners of the companies are. In "*Cultural Proximity and Production Networks*" (under review, with Brian Fujjy and Hiroshi Toma), we examine how cultural proximity shapes production linkages and affects aggregate productivity. We combine new data on firm-to-firm trade from India with information on caste/religious connections between firms. We find that larger cultural proximity between a pair of firms reduces prices and fosters trade at both intensive and extensive margins. Social inclusion policies can raise welfare, while social isolation lowers welfare.

### Culture, Development, and Political Economy in India

Like education and migration, culture can affect various aspects of what drives India's economic development, like urbanization and entrepreneurship.

Cultural norms, like dowry, may play a crucial role in rural-to-urban migration in India. "*Traditional Institutions in Modern Times: Dowries as Pensions When Sons Migrate*" (revise and resubmit at the *Quarterly Journal of Economics*, with Natalie Bau, Corinne Low, and Alessandra Voena), examines how dowry can enable male migration by increasing liquidity at the time of marriage. One cost of migration is the disruption of traditional elderly support structures, where sons co-reside with parents and care for them in their old age. Dowry provides sons and parents with a liquid transfer that eases constraints on income sharing. We collected two new datasets on property rights over dowry among families of migrants, documenting for the first time that grooms' parents do maintain property rights over the dowry. Exploiting a large-scale highway construction program, we show that men from areas with stronger dowry traditions have a higher migration response to a reduction in migration costs. Despite its potential negative consequences, dowry may play a role in facilitating migration and, therefore, urbanization.

In "*Shared Identity and Entrepreneurship*" (under review, with Manaswini Bhalla, Ishani Chatterjee, and Manisha Goel), we document that shared identity with elected leaders helps entrepreneurs form new and productive businesses. In the aftermath of close Indian elections, we show that firm entry by entrepreneurs belonging to the same cultural groups as the winning candidates increases. Despite benefiting from preferential behavior, and in contrast to earlier work, such politically-connected entrants are actually more productive. The high productivity of in-group entrants suggests barriers previously precluded the entry of high-performing firms.

The above paper highlights the complexity of India's political apparatus, which I investigate further. We know little about the electoral effects of policies with broad appeal that are implemented by popular leaders, but which have adverse economic effects. In "*Political Accountability for Populist Policies: Lessons from India's Demonetization*" (in the *Journal of Public Economics*, co-authored with Priya Mukherjee) we analyze voter behavior following India's 2016 'Demonetization' policy, which unexpectedly made 86% of the currency redundant overnight, and led to severe cash shortages and economic hardship. We find that voters in places with more severe demonetization had less favorable views of the policy, and the ruling party performed relatively worse there. Yet, areas that were historically strongholds of the ruling party were nearly unresponsive in voting behavior, despite having a less favorable view of the policy.

Such sudden and dramatic policy-induced shocks in India can substantially affect the welfare of households. The COVID-19 pandemic brought the dual crises of disease and the containment policies designed to mitigate it. Yet, there is little evidence on the impacts of these policies on women in lower-income countries, where there may be limited social safety nets to absorb these shocks. In "*Women's Well-being During a Pandemic and its Containment*" (in the *Journal of Development Economics*, with Natalie Bau, Corinne Low, Manisha Shah, and Alessandra Voena), we find that the pandemic resulted in dramatic income losses, increases in food insecurity, and declines in female mental health. The lockdowns increased the reporting of depression, exhaustion, and anxiety. These set of papers highlight how culture and political economy affect entrepreneurship, urbanization, and overall economic well-being in India.

### How Economic Opportunities Determine Participation in Conflict

An important factor afflicting developing economies is violence and conflict, and its relationship with regional development and economic opportunities.

Large-scale poverty and lack of employment in certain areas of India have led to the rise of insurgency violence. "*Guns and Butter: Fighting Violence with the Promise of Development*" (with Laura Zimmerman; in the *Journal of Development Economics*) examines how the Indian government relied on one of the world's largest public works programs to win over the support of the civilian population and use their assistance and information in cracking down on insurgent violence. Creating an original dataset from news reports, we used a Regression Discontinuity design and found that after program implementation, defense against rebels was stepped up in the short term and overall violence started to decline in the longer term. In related work, we published "*Fighting Maoist Violence with Promises: Evidence from India's Employment*

*Guarantee Scheme*" in the *Economics of Peace and Security Journal*, which examines the dynamic trends in violence surrounding large governmental programs in India.

My other work studies conflict in Africa – "*Resource Accumulation, Conflict, and the Development of Africa*" (published at the *Journal of Development Economics*; with Achyuta Adhvaryu, Anant Nyshadham, and James Fenske), examines how resource shocks like rainfall, diamond mines or oil fields increase conflict between neighboring countries as they try to appropriate resources from each other or use them to build armies. Studying how resource accumulation in neighboring countries affects conflict is a unique contribution to the literature. These papers highlight how access to jobs and resources affects participation in conflict.

### How Economic Opportunities Determine Participation in Criminal Enterprises

Building on this research agenda on violence, I examine why youth in Medellin (Colombia) join gangs. Over many years, I worked with a team to combine a comprehensive administrative database of arrests, employment, and other outcomes.

Our first paper, "*Job Loss, Credit and Crime in Colombia*" (published in the *American Economic Review: Insights*, with Carlos Medina, Anant Nyshadham, Christian Posso, and Jorge Tamayo) examines how job loss can push vulnerable youth into a life of crime. It also examines mitigating factors that allow youth to not have to join gangs, such as access to small loans, and alternative job opportunities. Importantly, it documents spillovers of such shocks to other family members (such as other youth), that exacerbate such shocks.

Relatedly, our paper "*Formal Employment and Organised Crime: Regression Discontinuity Evidence from Colombia*" (published in the *Economic Journal*, and co-authored with Carlos Medina, Anant Nyshadham, Jorge Tamayo, and Nicolas Torres), asks if discouraging formal employment via benefits eligibility criteria increases criminal enterprise activity. We link administrative socioeconomic microdata with the universe of arrests in Medellín over a decade, and use regression discontinuity estimates to show this policy reduced formal-sector employment and generated a corresponding increase in arrests associated with organized crime.

In ongoing work, my co-authors and I study how access to lucrative employment opportunities in other parts of the city of Medellin, via the expanding transportation network, affects criminal participation. In our paper "*Spatial Mobility, Economic Opportunity and Crime*" (under review, co-authored with Carlos Medina, Anant Nyshadham, Daniel Ramos, Jorge Tamayo, and Audrey Tiew), we ask: Does improving connectedness between segregated and unequal parts of a city predominantly import opportunity or export crime? We use a spatial general equilibrium framework to model the local economy, and construct a novel, granular dataset recording the origin and destination of both workers and criminals needed to identify key parameters of the model. We then leverage the roll-out of a cable car system to show that overall criminal activity in the city is reduced, and total welfare was improved for almost all neighborhoods when their connectedness was improved. These papers unpack how youth in Colombia get involved with gangs when they have less access to legitimate economic opportunities.