

This statement gives an overview of my research and briefly describes my teaching and other service.

1. Research

I am a development economist. My work introduces new ways to measure, conceptualize, and analyze production in economies with substantial distortions: in particular, how the performance of private firms and public-sector organizations interacts with three specific frictions often seen in developing countries—incomplete contracting and the corresponding reliance on relationships; high information and trade costs; and limited state capacity.

The first branch of my research investigates how *relationships*—links between individuals, between firms, and between individuals and firms—shape productivity and other dimensions of firm performance. In less-developed regions of the world, formal contracts are typically hard to write and enforce. In such an economic environment, relationships can have an important role upholding or hampering economic activity. My work examining relationships both within and between firms bridges the two halves of the field of organizational economics. Some of my work supports the conjecture that “substantially the same factors that are ultimately responsible for market failures also explain failures of internal organization” (Williamson, 1973: 316). Two of my papers on relationships for example show how ethnic divisions lead to misallocation and lower value creation both in factory production lines and stock market investment in firms in Kenya. In another paper, my coauthors and I study how manufacturers achieve export-grade output quality when input quality cannot be controlled through contracts. We show that, in Peru, they do so by changing their relationship with suppliers through vertical integration.

The second branch of my work examines how organizational performance evolves when globalization alters *information and trade costs*. Over the past 30 years, developing countries have become more integrated into the global economy as a result of reduced trade and information barriers and opening up to foreign direct investment. This has significant implications for firms. In this branch of my work I focus mostly on labor—jobs and wages—to measure how firms respond to globalization. For example, I have studied how access to fast Internet affects job creation in Africa and how multinationals from richer countries set wages and organize production in poor countries.

In the third branch of my research, I study *organizational performance in the public sector*. To grow their economies, countries need an effective state. My work examines both the “state enterprise” as a whole and its underlying public entities as organizations, and I consider issues such as labor productivity in the bureaucracy and how greater access to information affects state leaders’ decisions. The themes I study in this part of my research thus often resemble public sector analogues of my work on firms, and vice versa.

Using theory and organizational performance insights from various other sub-fields—including labor, organizational, and behavioral economics—I provide rigorous empirical evidence on long-standing questions in development economics. Most of my work uses quasi-experimental methods and existing firm and administrative data that have not previously been accessed by researchers from “natural” settings. I have also implemented large-scale randomized-controlled trials (RCTs) with and on organizations. With this combination of data and methodology I add a new dimension to development economics research.

My research has received attention for its contributions to economics both among academics and policy-makers. Several of my papers have won high-profile “best paper” awards, and I have raised more than \$1,250,000 in grant funds from external sources. My work has been featured in media outlets such as *The Economist*, *NPR Planet Money*, *Le Monde*, and *Folha* (Brazil’s biggest newspaper), and appears to have influenced priorities at major institutions such as the World Bank, OECD, USAID, and the Gates Foundation.

1.1 Relationships and organizational performance

1.1.1 Ethnic divisions in firms and in markets

My paper **“Ethnic Divisions and Production in Firms”** [1], published in the *Quarterly Journal of Economics* in 2014, addresses a longstanding question in development economics: why ethnically heterogeneous countries tend to be poorer. Prior investigations had focused on politics and the public sector. I hypothesized that adverse relationships between ethnic groups might also directly lower organizational performance—productivity—in the private sector if firms or workers ethnically discriminate. The possibility of discrimination that is costly to the discriminator, or animosity, goes back to Becker (1957). Classical models—most famously Arrow (1973)—describe how competitive forces can eliminate such economically self-harmful behavior, but estimating the costs of discrimination had proven difficult to do outside of the lab.

To test my idea, I use data from a large flower-packing factory in Kenya. Production took place in three-person teams, wherein a “distributor” allocates inputs to two “finishers” whose output I observe. The downstream workers were paid based on their individual output, while the distributor was paid based on total team output. Distorting input allocation because of ethnic animosity will thus lower the distributor’s own pay, but favoring coethnics may increase *their* output. The paper begins with a theoretical framework that distills this insight.

At the factory, when a worker left for her leave, a returning worker took her place. This generated arbitrary variation in team composition that allowed me to document the following findings. Upstream workers lower team output and own pay by misallocating inputs when one or both finishers are of a rival ethnicity. Such discrimination worsened during an early 2008 period of increased ethnic strife in Kenya. When the factory began paying *downstream* workers based on team output, distributors stopped misallocating inputs *across* the two (but continued to discriminate “vertically”). Animosity (or “taste-based”) discrimination theories predict these findings, but they are hard to reconcile with alternative forms of discrimination.

The paper identifies and explains an adverse effect of ethnic divisions on productivity and incomes; provides some of the first direct evidence consistent with social preferences from a natural setting; shows how exposure to conflict shapes discrimination; and documents how incentive systems can mediate the ultimate economic impact. Other researchers have continued to study both the general theme of ethnic divisions and organizational productivity, as well as a set of more specific themes that emerge in my paper. These include the output costs of horizontal input misallocation; how macro-level conflict affects workplace discrimination; and motivations underlying discrimination inferred from the discriminator’s costs of discriminating.

The paper was awarded the 2013 CESifo Prize for best paper in Applied Microeconomics, and is taught in PhD Economics courses in leading departments including at University of Chicago, Harvard, LSE, MIT, and U.C. Berkeley. It was cited prominently in Azulai et al.’s (2014) review on “State Effectiveness, Growth, and Development”; Bertrand and Duflo’s (2017) survey of field experiments on discrimination; Collier’s (2017) review on “Culture, Politics, and Economic Development”; DellaVigna’s (2018) handbook chapter on structural behavioral economics; Kremer, Rao and Schilbach’s (2019) handbook chapter on behavioral development economics; Shayo’s (2019) review on “Social Identity and Economic Policy”; and Bandiera et al.’s (2019) review on “The State and Economic Governance”. The OECD cited the paper in its 2018 “International Diversity Forum”.

This first paper studies discrimination within one firm. Quantifying *market-wide* economic impacts of adverse relationships between ethnic groups—the focus of Arrow’s skepticism—helps us understand the broader consequences for society and the form and limits of market forces’ disciplining potential. I attempt to do so in a follow-up paper titled **“Ethnic Investing and the Value of Firms”** [2] (revised & resubmitted to the *Journal of Political Economy*), with Changcheng Song and Chris Yenkey. We examine ethnic relationships that are external to the firm: those with investors. We analyze data on the universe of transactions on Kenya’s stock exchange (the NSE) over five years. The data include last names, from which investor ethnicity can be inferred. We define the ethnicity of a *firm* as that of its CEO, or alternatively the ethnic composition of its board of directors.

We first show that, in Kenya, a given small investor invests more in a given large firm when the firm is run by a coethnic CEO/board. Exploiting changes in firms’ ethnicity resulting from CEO/board turnover allows us to isolate

the effect of coethnicity itself. The existing literature on discrimination—including my earlier paper—in contrast capture responses to coethnicity combined with other ways in which coethnics tend to “match”.

Next we show that investors discriminate despite earning lower risk-adjusted returns on coethnic investments. We use a simple model to predict expected value creation in counterfactual scenarios with less discrimination. To quantify the magnitudes empirically, we exploit both demand- and supply-side variation in each firm’s pool of coethnic and neutral *potential* investors. Supply-side variation arises from abrupt changes in which particular investor group makes up a given firm’s coethnic investor base when CEO turnover changes a firm’s ethnicity. Back-of-the-envelope calculations using our estimates imply, for example, that listed Kenyan firms could collectively be worth 37 percent more if 50 rather than 4.2 percent of active investors were ethnically neutral, with minority-run firms benefitting the most. We find empirical support for the theoretically predicted demand- and supply-side responses to discrimination, but they appear too small in magnitude to fully counteract the economic impact of the “misallocation of demand” that results from investors’ ethnic discrimination.

Together, my QJE 2014 paper and our follow-up paper document significant economic costs of ethnic discrimination in the private sector.

1.1.2 Vertical production chains and organizational performance

In my QJE 2014 paper I study how ethnic relationships on a vertical production line influence the total quantity a Kenyan plant produces. Modern production often takes place in vertical value chains encompassing multiple firms. In a more recent paper, **“Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters”** [3] (*Journal of Political Economy*, 2020), Chris Hansman, Gianmarco León, Matthieu Teachout, and I study downstream manufacturers’ choice of relationship form with upstream suppliers, a classical theme in economics (Holmstrom and Milgrom 1991, Holmstrom 1999, Baker et al. 2001, 2002). We show how output quality incentives affect this choice when information frictions complicate contracting with suppliers.

Firms in developing countries often benefit from producing high-quality products that can be exported to quality-sensitive foreign markets. This typically requires high quality inputs, but input quality can be hard to measure and therefore to verifiably specify in contracts. We hypothesize that, when suppliers multitask, firms choose to vertically integrate in order to produce higher quality products. We use a stylized framework to illustrate the intuition: when independent suppliers have alternative buyers that value input quantity the most, they may take quantity-increasing actions that are harmful to quality-oriented manufacturers’ input quality.

The Peruvian fishmeal manufacturing sector is well-suited for testing our hypothesis. It is supplied by one of the world’s largest fisheries. Unusual data on its entire chain of production are available—including all manufacturer-supplier transactions; direct measures of output quality; and regulatory GPS tracking of fishing boats that can be used to measure supplier behavior. Additionally, characteristics of the industry map directly to the seminal theoretical work we build on: fish quality is difficult to observe and contract on, and independent suppliers can sell to many manufacturers. Finally, variation in the fishing quotas of other countries that export fishmeal generate exogenous variation in the quality premium (the relative price of high-quality fishmeal).

There are three main findings. First, manufacturers are more likely to integrate suppliers when the quality premium rises, and firms with more to gain from upgrading quality respond more. Second, a given supplier changes its behavior consistent with attempting to deliver higher-quality (but lower-quantity) inputs to a given manufacturer once integrated. Third, greater weather-induced use of integrated suppliers increases quality.

Our paper bridges the literatures on firms’ choice of organizational structure and quality upgrading for the first time, and provides a direct test of the classical theories linking organizational structure and supplier multitasking. It won the “Best Conference Paper” award at the Society of Institutional and Organizational Economics’ 2018 annual conference in Montréal, where 180 papers were presented, and is cited in Atkin and Khandelwal’s (2020) survey of “How Distortions Alter the Impacts of International Trade in Developing Countries” and in Ménard and Shirley’s (2018) book “A Research Agenda for New Institutional Economics”.

Input-output linkages in the economy are also at the center of an earlier paper titled **“Interlinked Firms and the Consequences of Piecemeal Regulation”** [4] (*Journal of the European Economic Association*, 2019) that

coauthors Chris Hansman and Gianmarco León and I wrote using data from the same setting. In this paper we focus not on information constraints facing downstream firms, but on information constraints facing *regulators* when sectors are interlinked. Similarly, the dimension of organizational “performance” we focus on is not manufacturers’ output quality, but the environmental externalities they generate.

Most regulations target particular firms and a specific externality, ignoring the links that connect sectors in the economy. The Peruvian fishmeal manufacturing industry offers an interesting setting to examine such “piecemeal” regulation. It features two textbook externalities: over-extraction of fish by upstream fishing boats and air pollution from downstream fishmeal manufacturers. We study the 2009 introduction of individual property rights over fish. These are considered “optimal” policy for preventing over-extraction, but this ignores the link between fishing boats and the manufacturing plants they supply. We first use a model to illustrate the simple but general point that targeted firms’ response can increase externalities generated elsewhere in the economy. Then we show empirically that the 2009 reform, while reportedly stemming over-extraction, additionally shifted the time profile of production, first upstream and in turn downstream. This dramatically increased the health impact of air pollution from downstream plants, causing 55,000 additional local respiratory hospital admissions per year. This specific finding and the paper’s broader insight both have important implications for the regulation of firms and sectors that operate as part of a production chain.

1.1.3 Summary: Relationships and organizational performance

Section 1.1 has detailed my work on relationships—between co-workers, between investors and firms, and between firms themselves—and organizational performance. I am optimistic about the future of this line of research. The evolution and increased integration of the global economy makes understanding production chains ever more important (as evidenced by the World Bank’s choice of topic for the 2020 World Development Report: “Global Value Chains: Trading for Development”), and production chains fully or partly located in developing countries tend to be made up of relationships. I am continuing to develop new projects on this theme. In an early-stage project, Laurence Go and I are for example digitizing data needed to examine a 1975 reform in the Philippines that mass naturalized local-born foreign residents. This expanded ethnically Chinese Filipinos’ ability to own businesses and make economic use of their relationships both in the Philippines and China.

1.2 Globalization, information and trade costs, and firms’ labor market behavior

1.2.1 Connectivity and organizational performance

In the second branch of my research, I examine how economic connections with the rest of the world and underlying information and trade costs affect organizational performance—in particular firms’ labor market behavior—in developing countries. This area of research is exciting from an academic perspective: traditional economic theory predicts much greater employment growth in poor countries than we observe empirically. It is also rewarding for more immediate reasons, because of the importance of good policy priorities for stimulating job creation and wage growth in poor countries.

Themes from the first branch of my work continue through this second branch. Like the analysis of Peruvian exporters’ strategies for supplying quality-sensitive foreign markets in “Vertical Integration,...”, **“The Arrival of Fast Internet and Employment in Africa”** [5] (*American Economic Review*, 2019), coauthored with Jonas Poulsen, also starts from globalization-induced changes in firms’ potential “reach”. Why recent globalization appears not to have benefited poor workers in developing countries—the locally abundant factor—to the extent that traditional trade theory predicts is a long-standing puzzle in economics. Before our AER paper, “computerization” was thought to be a key explanation. Information and Communication Technologies (ICT) had been shown to be skill-biased and to help explain increasing inequality in rich countries. However, there was no direct evidence on their average and distributional economic effects in poor countries’ labor markets.

Our paper exploits the arrival on Africa’s coast of 10 submarine Internet cables in the 2000s and 2010s. They reached different countries sequentially, in a geographically determined order. We estimate the impact of access to fast Internet by comparing “connected” individuals and firms that are near the terrestrial cable network to others, before versus after the submarine cables greatly increased the network’s speed and capacity. Using survey data from 12 countries, we establish three findings. First, the (relative) probability that a connected

individual is employed increases by 6.9 and 13.2% in two groups of countries covered by multi-country surveys, and by 3.1% in South Africa, when fast Internet becomes available. This is not due to displacement of jobs in unconnected areas. Second, the overall impact on employment is driven by increased probability of being employed in a position belonging to a skilled occupation, while the probability of holding an unskilled job is statistically unaffected. Finally, we find that *employment inequality*—the relative probability of employment across the educational attainment range—if anything falls with fast Internet in Africa.

To begin to understand these impacts, we use firm-level data. We structurally estimate how Ethiopian manufacturers' production function changes with fast Internet, finding higher firm-level but not higher labor productivity. This could be because fast Internet allows firms to produce higher quality products or secure contracts more easily. (I investigate the latter possibility in follow-up work discussed below). We also document a large increase in net firm entry in South Africa, notably in sectors that use ICT extensively. Finally, we use World Bank data on firms in six African countries to show that firms appear to export more, communicate with clients online more, and train employees more when they get access to fast Internet.

In sum, our AER 2019 paper establishes that the slower-than-expected economic progress of poor workers in Africa during the last few decades does not appear to be due to the factor bias of new technologies like fast Internet. Labor market responses of the magnitude we document point towards feasible policy options with considerable employment-creating potential in Africa, such as building more Internet infrastructure or better connecting different African countries' terrestrial cable network.

The empirical approach in our paper has since been adopted by many other studies and empirical evidence supportive of the large employment effects of internet we found documented in many other developing country contexts (see for example a review article Lin Tian and I recently completed titled **"The Economic Impact of Internet Connectivity in Developing Countries"** [6]). Hjort and Poulsen (2019) also appears to have influenced policy decisions already. It was prominently cited in World Bank Chief Economist Pinelopi Goldberg's blog-post on the bank's "Moonshot Africa" initiative to "digitally connect every individual, business and government in Africa by 2030"; in the World Bank's flagship World Development and Global Economic Prospects reports for 2021; in World Bank board-level budget allocation discussions (according to its Infrastructure Vice Presidency); and in the bank's yearly flagship report for 2020 on "Global Value Chains: Trading for Development". The paper was also cited first among the evidence-base that led to the Gates-funded Pathways to Prosperity Commission at Oxford University (Phillips, 2020), and as part of the evidence-base for USAID's 2020-2024 Digital Strategy and CDC Group's (the U.K. government's Development Finance Institution) investment in fiber-optic Internet cables in Africa and the Rockefeller Foundation's "Digital Jobs Africa Initiative"; in the "Financing for Sustainable Development Report 2020" of the U.N. Inter-agency Task Force on Financing for Development; in the U.N. agency UNCTAD's flagship report on "Trade and Development" in 2018; in evidence provided to the U.S. International Trade Commission on "U.S. Trade and Investment with Sub-Saharan Africa: Recent Trends and New Developments" and Atlantic Council's "Priorities for U.S.-Africa Commercial Policy in the Biden Administration" report; in the European Commission's 2021 policy brief on "Addressing income inequalities through development cooperation"; and in the OECD's "Africa's Development Dynamics: Digital Transformation for Quality Jobs" 2021 report (as a "landmark study"). The paper was covered in *The Economist*, *Le Monde*, and other major media outlets, and is cited in Atkin et al.'s (2019) review article on "Firms, Trade and Productivity" and in Papaioannou and Michalopoulos's (2019) review article "Spatial Patterns of Development".

Existing research indicates that firms and workers in developing countries benefit significantly when firms export. The impact of fast Internet on exporting we document in our AER 2019 paper is thus important. It suggests that African firms whose products have sufficient "appeal" can and do succeed at selling to foreign consumers once they have the technological means to market their products. I investigate this possibility from a different angle in a new follow-up paper titled **"Informational Barriers to Market Access: Experimental Evidence from Liberian Firms"** [7], coauthored with Vinayak Iyer and Golvine de Rochambeau.

We hypothesize that many productive firms in developing countries stagnate due to informational barriers to accessing markets. Thus we measure organizational performance not in labor markets, but by the extent to which a firm wins desirable contracts. To investigate, we gave a subset of established Liberian firms the opportunity to participate in a training program through a randomized-controlled trial. The program exclusively teaches how to bid on large buyer-contracts that are awarded through a formal procurement process. We find

that, on average, the program increases the number of contracts firms bid on; the total number and quality of contracts won; and the number of contracts won through other channels than a formal tender process. However, these benefits are concentrated among a particular segment of the firms in our sample. The same group of firms that benefit one year out from the training—a key characteristic is their access to the Internet—do so also two years out. At that point this top quartile of initially stagnant firms not only win more and better contracts relative to control group firms, they are also more likely to survive, and they increase employment. Our results suggest that reducing informational barriers to market access and enhancing firms' access to ICT technologies may prove an especially powerful policy combination in Africa.

1.2.2 Multinationals' wage-setting and job creation poor countries

The papers discussed in section 1.2.1 examine how changes in connectivity affect organizational performance and job creation in Africa. However, the world economy is already quite globalized: goods can be transported across continents and information exchanged at low cost. A core tenet of traditional economic theory is that firms should then locate jobs where wages are low. In reality they do so to a surprisingly limited extent.

In a recent paper titled **"Across-Country Wage Compression in Multinationals"** [8] (revise & resubmit at the *American Economic Review*), my coauthors Xuan Li and Heather Sarsons and I hypothesize that wage-setting procedures can pull firm-wide wages in multi-establishment firms towards the level that prevails at headquarters. To investigate, we focus on a canonical example of high-wage firms with particular relevance for poor countries: multinationals. We use an unusual dataset on what 1,070 large multinationals pay domestic (non-expat) workers employed in given position around the world.

We first show that, across the occupational wage range, changes in the wage a given multinational pays workers in a given job are highly correlated across countries the employer operates in. Next we show that multinationals also transmit *externally imposed* changes in headquarter wages to their foreign establishments, pointing towards a causal relationship. In our analysis the sources of these "headquarter wage shocks" are changes in headquarter country/state minimum wage laws and appreciations/depreciations of the country's currency. Transmission of headquarter wage shocks occurs also—in fact, especially—in low-skill occupations, such as cleaners, drivers, and security guards, and is found also in an entirely different form of outcome data—employer-employee data from Brazil—where we can hold constant the individual worker in question.

In the final part of the paper, we show evidence that the impact of headquarter wages on foreign wages is direct. Such transmission does not appear to arise through factors that are external to the worker (such as induced technological investments by the firm or changes in employment at its foreign establishments). The characteristics that predict "anchored" wage-setting are largely (correlated) features of the headquarter country/state, such as union coverage, (low) inequality, and (high) cultural inequality-aversion.

In addition to documenting this novel regularity—that many employers anchor their wages to the level at headquarters—our analysis helps uncover the nature of the well-known but poorly understood phenomenon of "firm wage effects" and presents what to our knowledge is the first evidence of *across-country* margins of adjustment to minimum wages. We have presented the paper at many leading departments and conferences.

The patterns we document in "Across-Country..." suggest that high wages may be an important part of the reason why most production is done by self-employed workers or in small, single-establishment firms in poor countries (Bloom et al., 2012). In rich countries, production is instead dominated by large multi-establishment firms where middle managers monitor and coordinate activities. In an ongoing follow-up project titled **"The Missing Middle Managers: Labor Costs, Firm Structure, and Development"** [9], coauthors Hannes Malmberg and Todd Schoellman and I investigate this. We document that the price of middle management varies little with development, which implies that its relative price is much higher in less developed countries. We establish that this high relative price deters the adoption and spread of modern business enterprises. We primarily rely on the dataset from my earlier paper ([7]), combining it with related datasets from other sources to document that we accurately measure the wage of each particular job—narrowly defined by their tasks and responsibilities—across a wide range of countries. Our key finding is that the level of compensation for middle managers is in line with GDP per worker in rich countries but an order of magnitude higher in poor countries. When we control for firm-job-year interactions, we find an elasticity that is a precisely estimated zero. We quantify the importance of this

finding using a calibrated appropriate technology model, finding for example that the revenue share of modern business enterprises would increase from 17 to 56 percent and aggregate output would rise by 31 percent if poor countries instead faced U.S. relative prices.

1.2.3 Summary: Globalization, information and trade costs, and firms' labor market behavior

Section 1.2 has detailed the second branch of my research, which focuses on how the rapidly changing economic connections with the rest of the world affect jobs and wages in the “global South”. Several themes from the first branch of my work on relationships and organizational performance continue through this second branch of my work. These include how constrained access to information affects organizational performance and allowing for an expanded “type space” of economic agents, such as firms with nontraditional wage-setting practices.

I am continuing to develop projects on globalization and firms' labor market behavior. These include follow-up projects using granular geographical data to understand how large short-term impacts of fast Internet such as those documented in our 2019 AER paper arise. One e.g. focuses on so-called “data centers” and access to data.

1.3 Organizational performance in the public sector

No known episodes of sustained economic growth have occurred in the absence of an effective state. Both the state apparatus as a whole and its underlying public entities are organizations. The themes I study in the third and last part of my research, on causes and consequences of organizational performance in the public sector, thus often resemble public sector analogues of similar themes from my work on firms.

One recent paper in this branch of my work relates to both *state* and *firm* capabilities, and how the two interact. **“Strategic or Confused Firms? Evidence from “Missing” Transactions in Uganda”** [10] (accepted, *Review of Economics and Statistics*), is joint with Miguel Almunia, Justine Knebelmann, and Lin Tian. For taxing firms, most economists favor the value-added tax (VAT), which is now in use in 166 countries. The argument for the VAT is thought to be especially strong in countries where tax enforcement capacity is low. Buyers and sellers both report their transactions under the VAT so firms expecting cross-checks to happen was argued to make the tax “self-enforcing”. However, this assumes that states have capacity to cross-check reports and that firms are sophisticated enough to infer that cross-checks can occur and to bookkeep accurately.

We use responses to the incentives created by the VAT and its enforcement as a lab for studying firm and state effectiveness. Analyzing economy-wide data from Uganda's VAT and customs records, we first show that sellers and buyers report different amounts in 79% of transactions. In 40% of these, the tax-liable seller reports a *higher* amount. We develop a methodology that allows us to apportion discrepancies between the buyer and seller. We can then show that the majority of firms respond to ineffective enforcement in the “self-advantageous” manner that economic theory predicts; by overreporting total purchases and/or underreporting total sales. However, 25% of firms make consistent, liability-increasing reporting errors. We also show that firms evade significantly less when exposed to greater enforcement capacity, but “confused” firms adjust their behavior less than strategic firms. We do this by examining misreporting on input purchases that pass through customs, where a degree of monitoring happens automatically.

This analysis provides what to our knowledge are the first direct estimates of the extent of mistakes in an economy-wide population of firms. Our estimates imply that, despite revenue *gain* from firm errors, on net, unilateral VAT misreporting cost the Ugandan government around 4% of total tax revenue collected during 2013-2016, underscoring the VAT's limited self-enforcing properties in low state effectiveness settings.

Some of my research appears to have influenced policy practice. (For example, the Uganda Revenue Authority in 2018/19 began to develop systems that periodically cross-check firms' VAT reports against their transaction partners). But how do political leaders and the policies they implement in general respond to new information, such as findings from policy-evaluation research? This particular aspect of the organizational performance of states and polities depends on political leaders' interest in and attention to research; whether they update their beliefs in response to research; and whether they can and do ultimately act on new research findings. These are questions of fundamental importance for the science ecosystem. Coauthors Diana Moreira, Gautam Rao, Juan

Francisco Santini and I investigate this in **“How Research Affects Policy: Evidence from 2,150 Brazilian Municipalities”** [11] (*American Economic Review*, 2021).

We carry out the first polity-level experiments with sitting heads of government. Collaborating with the National Confederation of Municipalities (CNM) in Brazil allowed us to do so. In a first experiment with 657 municipalities, we show that political leaders display high demand for learning the results of policy-evaluation research, especially larger-sample studies. We also find that leaders update their beliefs when informed of research findings. Finally, those who believe a policy to be more effective (because of randomized exposure to research findings) have higher demand (willingness-to-pay) for practical policy implementation advice.

To estimate the ultimate impact of research on policy adoption, we use a larger-scale field experiment with 1,818 Brazilian mayors. Our methodology is essentially a public sector analogue to management interventions in private firms (see e.g. Bloom et al. 2013). A randomly selected group of mayors was invited to attend a research information session. A presenter informed the audience that a set of randomized-controlled trials had found a cheap and easy-to-implement policy (taxpayer reminder letters) to be highly effective. This increased the probability that municipalities had implemented the policy 15-24 months later by a remarkable 32%.

These results indicate that information barriers at the top of the public sector’s “production chain” directly constrain policy decisions. This implies that research can help political leaders improve constituents’ lives. Our findings also point towards a missing link that disconnects policy practice from research. The paper was prominently cited in Bandiera et al.’s (2019) review article on “The State and Economic Governance”, in a Center for Global Development paper on how to spend the billions of pounds the U.K. allocates to “economic development R&D” every year, and in a “Science Meets Parliament” report provided to Canada’s parliament by prominent researchers. It was also featured on NPR Planet Money (in an interview with Esther Duflo after her 2019 Nobel Prize), in *Folha*, Brazil’s biggest newspaper, and on a World Bank blog.

Another paper on state effectiveness, **“Individuals and Organizations as Sources of State Effectiveness”** [12] (revise & resubmit at the *American Economic Review*), is coauthored with Michael C. Best and David Szakonyi. Rather than the policy-making tier at the top of the state apparatus, this paper examines the effectiveness of the policy-*implementation* tier—the bureaucracy—and the implications for policy design.

The paper has two goals: to quantify the importance of the bureaucracy for public sector output and to explore the extent to which policy should be tailored to bureaucratic effectiveness. We focus on a task that is performed throughout the state—procurement of off-the-shelf goods—and which has a quantifiable output: prices paid. We first develop a simple theoretical framework in which suppliers are more interested in bidding on public procurement contracts that are managed by effective bureaucrats. We use this model to guide our analysis of administrative data covering all public procurement in Russia between 2011 and 2016.

To estimate the causal impact of individual procurement officers and bureaucratic organizations on performance, we exploit thousands of quasi-experiments that arise when organizations are observed working with multiple bureaucrats and vice versa. To compare only those buying the same type and quality of good, we adapt machine learning tools to classify purchases into homogeneous bins using the text of procurement contracts. This allows us to measure performance public sector-wide, which has been difficult to do in past research.

We find that over 40% of the variation in performance—quality-adjusted prices—is due to the individuals and organizations that manage procurement processes, implying enormous savings from improving bureaucratic effectiveness. To provide a concrete example of the policy design implications, we study a common bid preference regime favoring domestic manufacturers. We identify its impact exploiting time- and good-level variation in policy coverage. We estimate cost savings and increased likelihood of domestic producers winning contracts that are considerably larger when the policy is implemented by *less* effective bureaucrats. This is consistent with intuition developed in our model. When state effectiveness is low, baseline supplier participation is low and so is the likelihood that a local bidder who enters has to face a more efficient, foreign, bidder. Bid preferences then have a large impact on participation by locals. Additionally, foreign bidders increase their price to offset the bid penalty. We show that the ultimate price effect depends negatively on state effectiveness.

Our paper quantifies the importance of the bureaucracy for public sector output in an apples-to-apples comparison for the first time. It also advances an emerging body of evidence on context-specific policy design—a theme also in my QJE 2014 paper, my JEEA 2019 paper, and my work on responses to VAT in Uganda. The paper is taught in PhD Economics courses in leading departments including MIT and NYU, and cited in Gentzkow, Kelly and Taddy's 2019 review article "Text as data". We have presented the paper at many leading departments and conferences.

1.4 Summary and other research

Sections 1.1-1.3 have summarized the three main branches of my research, on *Relationships and organizational performance*, *Globalization and firms' labor market behavior*, and *Organizational performance in the public sector*. I have also done some work on other topics, most of which was started during my PhD. This include a paper for a 1st year PhD course on Economic History (on Tswana culture and Botswana's economic success—the paper was published in the *Economic History Review* in 2010); a coauthored descriptive study of changes in economic activity in Liberia during the 2014 Ebola outbreak (published in *BMJ: Journal of Epidemiology & Community Health* in 2016); and a coauthored health economics paper published in the *American Economic Journal: Applied Economics* in 2017.

I regularly present my research in seminars at leading economics departments and business schools, including Brown, Chicago, Harvard, LSE, MIT, NYU, Northwestern, Princeton, Stanford, Yale, UCLA, UCSD, and Wharton; and at the high-profile meetings of the National Bureau of Economic Research (NBER). I have also presented my research at policy-making institutions such as the IMF, the World Bank, the International Growth Centre (IGC), and the Uganda Revenue Authority.

2. Teaching and Other Service

2.1. Teaching

From 2013 to 2015 I taught the course "The Private Sector and International Development" to MBA and EMBA students at Columbia Business School (CBS). I designed the course drawing on related courses. In 2015 I taught a shorter version of this course, partly in Mexico City, to student participating in a joint CBS-IPADE degree. Since 2016 I have taught "Managerial Economics", CBS's core microeconomics course, to MBA students. In fall 2019, across four sections (each of approx. 55 students), my average professor and course ratings were 4.4 and 4.3 (on a 5 point scale. In fall 2020, across two sections with students both in the classroom and connecting online, my average ratings were 4.05 and 4.1). I also teach "Global Immersion: New Growth and Business Opportunities in East Africa", a course that introduces students to East Africa's economy, and is one of the most in-demand courses at CBS (as measured by the clearing prices generated by student course bidding). Since some of my own work is on East Africa, I am able to introduce the latest research on these economies and bring exciting guest-speakers to the course. In spring 2019, the MBA course rating was 4.7 and my professor rating was 4.2. I have also guest-lectured in PhD Development Economics courses taught at Columbia's Economics Department, and in 2015, I presented a summary of my research at Columbia's Program for Financial Studies.

2.2. PhD advising

I co-advised the following PhD students, most of whom completed their PhD in Economics at Columbia (first job/year of PhD in parenthesis): Jonas Poulsen (Lecturer, Dept. of Economics, Harvard University/2015), David Szakonyi (Post-doc, Harvard Univ. Academy. & Assistant Professor, Dept. of Pol. Science, GWU /2016. David turned down an A.P. offer from MIT's Political Science department), Nicolás de Roux (A.P., Dept. of Economics, Universidad de los Andes /2017), Christopher Hansman (A.P., Imperial College Business School /2017), Maria Micaela Sviatschi (A.P., Dept. of Economics, Princeton University /2017), Ashna Arora (Research Director, Crime Lab, University of Chicago), Lin Tian, (A.P., Insead/2018. Lin turned down an A.P. offer from UCSD's Economics department), Golvine de Rochambeau (A.P., Dept. of Economics, Sciences Po/2018), Xuan Li (A.P., Dept. of Economics, Hong Kong University of Science and Technology/2019), Matthieu Teachout (International Growth Centre/2019), David Alfaro-Serrano (Cornerstone Research/2020), Suanna Oh (Post-doc, briq Bonn. & A.P., Dept. of Economics, Paris School of Economics/2020), Yue Yu (A.P., Dept. of Management & Rotman School of

Management, University of Toronto/2020), Leonard Goff (A.P., Dept. of Economics, University of Georgia/2021). I also coauthored papers with nine of these PhD students.

2.3. Other service

I have served on all Columbia Business School's junior faculty microeconomics search committees during my time on the faculty, and in 2018/19 I was an external member of the junior search committee at Columbia's Economics Department. I have co-organized Columbia's Development Economics and Applied Microeconomics seminars (for external speakers) most semesters since 2013, as well as the internal microeconomics faculty lunch workshop at CBS and the Development Economics colloquium for PhD student presentations in the Economics Department during six years. I also helped launch a monthly "super seminar" starting in 2019/2020 through which the Applied Microeconomics, Development Economics, Industrial & Organizational Economics, and International Trade seminars jointly host speakers.

I am an affiliated faculty member at Columbia's Economics Department and a faculty affiliate of the National Bureau of Economic Research (NBER) (Development Economics and Productivity, Innovation and Entrepreneurship programs), the Bureau for Research and Economic Analysis of Development (BREAD), the International Growth Centre (IGC), and the Center for Economic and Policy Research (CEPR). I am also an affiliated faculty member at Columbia's Center for Development Economics and Policy and CBS's Chazen Institute, and in 2016 presented my research to the Chazen Institute's board.

I have been the International Growth Centre's (IGC) Lead Academic for Liberia since 2014, and for Sierra Leone since 2018. The IGC is an organization based at the London School of Economics and Oxford University that focuses on promoting cutting-edge research that is relevant to the poorest developing countries. My role is to initiate such research on Liberia and Sierra Leone, connecting researchers and policy-makers.

I am an Associate Editor at the Journal of Development Economics, and I have refereed extensively for funding institutions and peer-reviewed journals, including the following (with the number of completed reports in parentheses): American Economic Review (24), Quarterly Journal of Economics (20), Review of Economic Studies (15), Journal of Political Economy (7), Econometrica (3), American Economic Review: Insights (2), Journal of the European Economic Association (15), Review of Economics and Statistics (11), American Economic Journal: Applied Economics (7), American Economic Journal: Economic Policy (7), Journal of Development Economics (13), Journal of Labor Economics (3), Journal of Public Economics (8).

The American Economic Review named me as a recipient of its Excellence in Refereeing Award in 2015.

In 2018 I was invited to present a seminar on "Firms and International Development: Examples from Africa and Latin America" to IMF staff members as part of its in-house economics training program.

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