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Education

University of Chicago, Ph.D. Economics *2016–2022*

University of Chicago, M.A. Economics *2016–2018*

Swarthmore College, B.A. Mathematics & Economics *2010–2014*

References

Professor Michael Greenstone (Chair)
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Research and Teaching Fields

Primary: Public, Development
Secondary: Energy, Environment

Job Market Paper

Do Value-Added Taxes Distort Input Decisions? Evidence from Pakistan

Abstract: *We examine how firms' input choices respond to the value-added tax (VAT) on purchases, using detailed VAT return data from Pakistan and a quasiexperimental variation in electricity VAT rates. Contrary to traditional theories that intermediate VATs don't affect production decisions, our study reveals a significant elasticity of electricity demand to VAT rates (-0.81). These findings aren't attributed to tax evasion shifts but to frictions in the VAT refund system. Specifically, many firms, not collecting VAT on output, depend on government reimbursements for their VAT credits, explaining our results.*

Work in Progress

The Economic Costs of Lopsided Contracts: Evidence from Power Purchase Agreements in Pakistan (with Tim Dobermann & Sugandha Srivastav; *Grants*: £16k IGC)

Abstract: *Virtually all electricity produced and sold in developing countries is through bilaterally negotiated long-term contracts between independent power producers (IPPs) and state-owned utilities. These power purchase agreements (PPAs) set the cost of electricity in a country, an important factor of production. Yet information on the terms behind PPAs is rarely disclosed, making them potentially ripe for rent extraction. In a first-of-its-kind effort, we compile a novel dataset on the universe PPAs signed in Pakistan since private participation began in 1994. Digging deeper, we use confidential financial disclosures on actual revenues and costs for a subset of IPPs to show that firms artificially inflate their true fuel costs in PPAs to generate excess profits. As a result, some producers earn annual real returns on equity above 80%, far beyond what is contracted. To conclude, we use a general equilibrium model to size the economic costs of these lopsided contracts by comparing against counterfactual electricity prices in the absence of rent extraction and in the presence of competitive procurement.*

Enhancing Enforcement through Religious Institutions: Experimental Evidence from Pakistan's Power Sector (with Robin Burgess, Tim Dobermann, Michael Greenstone, & Usman Naeem; *Grants*: £168k IGC, $75k J-Pal, $93k WEISS Fund)

Abstract: *The ability of governments to expand energy access runs aground when state capacity is limited. Weak enforcement creates a leaky bucket as electricity theft and unpaid bills go unchecked. As a result, energy access gets curtailed, especially for the poor. Together with the government of Pakistan, we are evaluating a novel intervention that seeks to shift social norms on the payment of electricity in areas beyond the reach of the state. Influential agents, notably local religious institutions (mosques), will deliver messages against electricity theft in treatment communities. A separate treatment arm provides financial incentives to pay for electricity. We use our experimental estimates to derive demand curves for electricity and theft using a simple theoretical model to quantify the fiscal value of the enforcement intervention. Our study takes place in Khyber Pakhtunkhwa, a rural, poor, and highly religious area of Pakistan where theft is widespread, making it an ideal setting to test if this is a cost-effective solution. Our proposal builds on a long-term engagement with the highest levels of the federal government in Pakistan.*

Technology and Audit Interventions to Combat Theft in Pakistan's Power (with Robin Burgess, Tim Dobermann, Michael Greenstone, & Usman Naeem; *Grants*: £90k IGC)

Abstract: *Pakistan's power sector faces a severe fiscal crisis: less than 75% of distributed electricity is paid for, contributing to a growing debt stock nearing 3% of GDP. To identify effective strategies for reducing electricity theft and non-payment, we partner with the Lahore Electric Supply Company (LESCO) to conduct a randomized field experiment in Punjab. The study tests the comparative effectiveness of anti-theft technologies—specifically aerial bundled cables (ABCs)—and enhanced enforcement through audits, as well as their combined effect. Treatments are assigned at the distribution transformer level: (T1) ABC cables, (T2) audits, and (T3) both interventions. LESCO provides administrative data and field support. Conducted at the request of the Ministry of Energy and LESCO, this study builds on a prior pre-pilot and will inform large-scale policy adoption across other districts and distribution companies in Pakistan.*

Awards, Scholarships, and Grants

University of Chicago Social Sciences Division Fellowship *2016–2022*

Teaching Experience

Empirical Topics in Social Insurance (grad)	TA for Prof. Deshpande	*Spring 2021*
Urban Spaces and Disasters (undergrad)	TA for Prof. Shaikh	*Winter 2020*
Econometrics (undergrad)	TA for Prof. Torcasso	*Fall 2018*
Global Energy & Climate Challenge (undergrad)	TA for Prof. Greenstone	*Winter 2017*

Research Experience and Other Employment

Post-Doctoral Research Fellow, International Growth Centre *2023–present*

Pre-Doctoral Fellow, University of Chicago *2014–2016*

Professional Experience

External Advisor, Federal Ministry of Energy, Pakistan *2019–2021*

External Advisor, Federal Board of Revenue, Pakistan *2023–present*

Other Writing

Building a Healthy Power Sector in Pakistan (with Tim Dobermann, Usman Naeem, Kamil Quddus, & Minahil Raza), *Government of Pakistan report*

A framework for productivity and export-led growth in Pakistan (with Ijaz Nabi et al.), *IGC Growth Brief*

Sustainable Pakistan: Addressing climate-driven demands and fiscal challenges for electricity (with Tim Dobermann, Sajid Malik, & Zuhair Khan), *IGC Growth Brief*

Additional Information

Citizenship	Pakistan
Programming Skills	Python, R, Stata, Julia, LaTex, QGIS
Languages	Urdu (Native), English (Fluent)

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