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DOCTORAL STUDIES

Massachusetts Institute of Technology (MIT)
PhD, Economics, 2012
DISSERTATION: "Empirical Essays on Firm Behavior in India"

DISSERTATION COMMITTEE AND REFERENCES

Professor Esther Duflo
MIT Department of Economics
50 Ames Street, E17 – 201A
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Professor Michael Greenstone
MIT Department of Economics
50 Ames Street, E17 – 218
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PRIOR EDUCATION

B.A., *summa cum laude*	Economics	University of Pennsylvania	2005

CITIZENSHIP USA **GENDER:** M

FIELDS

Primary Fields: Development Economics, Environmental and Energy Economics
Secondary Fields: Industrial Organization

CURRENT POSITION

Prize Fellow in Economics, Harvard University 2012-2014

RELEVANT POSITIONS

Visiting Researcher, University of California Energy Institute	April 2013
Sr. Research Assistant, Federal Reserve Board, Washington	2005-2007

FELLOWSHIPS, HONORS, AND AWARDS

AMID Early-Stage Researcher Fellowship	2011
Martin Fellowship for Sustainability, MIT Energy Initiative	2010-2011
Jameel Fellow, Abdul Latif Jameel Poverty Action Lab	2009-2010
MIT Graduate Fellowship	2007-2009
Phi Beta Kappa, University of Pennsylvania	2005
Simon Kuznets Fellowship in Economics	2004

PROFESSIONAL ACTIVITIES

Referee for: *American Economic Journal: Applied Economics; Journal of Development Economics, B.E. Journal of Economics and Policy*

Presentations: NEUDC (2013 expected, 2012); Texas A&M (2013 expected); European Bank for Reconstruction and Development (2013 expected, 2012); University of California Energy Institute Camp (2013, 2012); University of Virginia (2013); University of California – Davis (2013); University of California – Santa Barbara (2013)

Other: Evaluating Social Programs (Executive Training, Jameel Poverty Action Lab – South Asia), Teaching Assistant (2008, 2009) and Lecturer (2012, 2013)

JOURNAL PUBLICATIONS

"Truth-telling by Third-party Auditors and the Response of Polluting Firms: Experimental Evidence from India" (with Esther Duflo, Michael Greenstone and Rohini Pande), *Forthcoming, Quarterly Journal of Economics*.

"What Does Reputation Buy? Differentiation in a Market for Third-Party Auditors" (with Esther Duflo, Michael Greenstone and Rohini Pande), *American Economic Review, Papers & Proceedings,* 103 (3): 314-19.

RESEARCH PAPERS

"The Competitive Effects of Transmission Infrastructure in the Indian Electricity Market"

Infrastructure can improve welfare both by directly lowering the costs of trade and by fostering competition. I study the competitive effects of transmission infrastructure on welfare in the Indian day-ahead electricity market. Transmission constraints may increase local market power by limiting competition across regions. I estimate firm marginal costs from bids while accounting for transmission constraints. Using these cost estimates, I run counterfactual simulations to measure the effect of increasing transmission capacity given the endogenous response of bidders. I find that relaxing import constraints into the two most constrained regions would increase total market surplus by 19 percent. The strategic response of suppliers to transmission expansions accounts for 72 percent of this gain. The marginal benefits of capacity expansion into the two most constrained regions exceed the marginal costs of investment by factors of 1.63 and 3.50, respectively, indicating that grid expansion would raise social welfare.

"Do Depositors Monitor Banks?" (with Rajkamal Iyer and Manju Puri, NBER Working Paper #19050).

We use unique micro-level depositor data for a bank that faced a run due to a shock to its solvency to study whether depositors monitor banks. Specifically, we examine depositor withdrawal patterns in response to a timeline of private and public signals of the bank's financial health. In response to a public announcement of the bank's financial troubles, we find depositors with uninsured balances, depositors with loan linkages and staff of the bank are far more likely to run. Even before the run, a regulatory audit, which was in principle private information, found the bank insolvent. We find that depositors act on this private information and withdraw in a pecking order beginning at the time of the regulatory audit, with staff moving first, followed by uninsured depositors and

finally other depositors. By comparing the response to this fundamental shock with an earlier panic at the same bank, we argue that withdrawals in the fundamental run are due in part to monitoring by depositors though the monitoring appears to be more of regulatory signals rather than of fundamentals. Our results give sharp empirical evidence on the importance of fragility in a bank's capital structure and may inform banking regulation.

RESEARCH IN PROGRESS

"Is There an Energy-Efficiency Gap?: Experimental Evidence on the Returns to Efficiency Investments for Indian Firms"

Policy-makers favor energy-efficiency improvements as a near-term means of carbon emissions abatement. Reports of the Intergovernmental Panel on Climate Change (IPCC) have long stressed the importance of energy efficiency in any climate change mitigation strategy, and the head of the U.N. Climate Change Secretariat recently hailed energy efficiency as "the most promising means to reduce greenhouse gases in the short term." This favored position is based on the poorly tested idea that energy-efficiency investments are a low-cost or even no-cost form of abatement, as energy savings make such investments profitable for firms. This proposed study will test this idea rigorously by conducting a randomized-controlled trial of industrial energy audits in India, a fast-growing developing country whose future emissions will be important for global climate change. The study will measure the relation between engineering projections for energy savings and actually achieved savings and also test two leading economic hypotheses for why industry may not adopt technologies that appear privately profitable. Study results will indicate what policies might cost-effectively promote energy efficiency.

"The Costs of Enforcing Environmental Regulation: Experimental Evidence from Inspections of Polluting Plants" (with Esther Duflo, Michael Greenstone and Rohini Pande)

The social cost of reducing pollution includes not only the direct costs of abatement but also any distortions or costs due to enforcement of environmental standards. The latter type of cost may be the more important in developing countries with weak institutions and scarce public funds. This paper reports on a field experiment in the Indian state of Gujarat that increased the frequency of government inspection for polluting industrial plants. We find that plants inspected more frequently are caught in violation of official pollution standards more often and are threatened with legal action and closure more often. In response to this scrutiny, treatment plants modestly improve compliance but do not increase abatement expenditures or reduce pollution by a statistically significant amount. In ongoing work, we model the dynamic interaction between regulators and plants in order to to understand the response of plants to the treatment and recover comprehensive estimates of regulatory costs.

"The Effect of a Emissions Trading on Pollution Abatement Costs: Experimental Evidence from a New Emissions Market in India" (with Michael Greenstone, Rohini Pande and Anant Sudarshan)

Emissions markets theoretically reduce costs by allowing firms with the cheapest means of abatement to cut pollution. Despite this great advantage, their use in

environmental regulation has been limited mostly to developed countries. Working with the Government of India, we are designing and implementing an market for particulate matter emissions from industrial plants. We will test the effect of emissions trading on abatement costs and firm compliance by comparing plants in the market to a randomized control group on fixed emissions load standards. This study will extend our knowledge of emissions trading. Because most emissions markets cover whole sectors, existing empirical work on their effect lacks clear counterfactuals for plant emissions and costs. The need for evidence is particularly strong in our setting because market-based approaches to environmental regulation are essentially untested in the weak institutional environments of developing countries.

"Consumer Surplus from Electricity Use at the Bottom of the Energy Ladder" (with Robin Burgess, Michael Greenstone and Anant Sudarshan)
Access to electricity is critical to encouraging growth and reducing poverty. Around the world, 1.3 billion people have no access to electricity, including 300 million Indian citizens, most of whom live in rural areas. At the same time, the electricity sectors in developing countries are woefully inefficient, so that small, decentralized energy projects may play an important role in providing universal access. We partner with a provider of decentralized solar micro-grids in rural India to experimentally introduce electricity in off-grid villages and measure the consumer surplus from a basic connection. The outcomes will include both direct measures of benefits such as education and time-use and willingness-to-pay based on the demand for new connections. The project will involve primary data collection to produce a data set of unprecedented detail on the energy access and needs of the rural poor.