Max Vilgalys

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Education

Massachusetts Institute of Technology 2017-
PhD, Social and Engineering Systems
Committee: Jing Li, Namrata Kala, Whitney Newey
Dissertation: Essays on Measuring Climate Change Damages and Adaptation
Fields: Energy and environmental economics, nonparametric statistics, structural econometrics, industrial organization

Stanford University 2013-2017
B.S. in Electrical Engineering, with minor in German Studies
Stanford in Berlin, Fall 2015; Stanford in Washington, DC, Spring 2016

Experience

Research Assistant for Prof. Nikhil Agarwal	2020-2021
Research Assistant for Prof. Jing Li	2019-2020
Research Assistant for Prof. Dava Newman	2018
Data Analyst Intern, Western Interstate Energy Board, Denver, CO	2017
Software Development Intern, Lichtblick Renewable Energy, Hamburg	2016
Policy Intern, U.S. Department of Energy, Washington, D.C.	2016

Research

Estimating Continuous Treatment Effects in Panel Data using Machine Learning with an Agricultural Application (with Sylvia Klosin)
This paper introduces and proves asymptotic normality for a new semi-parametric estimator of continuous treatment effects in panel data. Specifically, we estimate an average derivative of the regression function. Our estimator uses the panel structure of data to account for unobservable time-invariant heterogeneity and machine learning methods to flexibly estimate functions of high-dimensional inputs. We construct our estimator using tools from double de-biased machine learning (DML) literature. We show the performance of our method in Monte Carlo simulations and also apply our estimator to real-world data and measure the impact of extreme heat in United States (U.S.) agriculture. We use the estimator on a county-level dataset of corn yields and weather variation, measuring the elasticity of yield with respect to a marginal increase in extreme heat exposure. In our preferred specification, the difference between the estimates from OLS and our method is statistically significant and economically significant. We find a significantly higher degree of impact, corresponding to an additional $1.18 billion in annual damages by the year 2050 under median climate scenarios. We find little evidence that this elasticity is changing over time.
Draft, July 2022

A Machine Learning Approach to Measuring Climate Adaptation (2020; revision in progress)
I measure adaptation to climate change by comparing elasticities from short-run and long-run changes in damaging weather. I propose a debiased machine learning approach to flexibly measure these elasticities in panel settings. In a simulation exercise, I show that debiased machine learning has considerable benefits relative to standard machine learning or ordinary least squares, particularly in high-dimensional settings. I then measure adaptation to damaging heat exposure in United States corn and soy production. Using rich sets of temperature and precipitation variation, I find evidence that short-run impacts from damaging heat are significantly offset in the long run.

Prepared for oral qualifying exams, June 2020. Presented at Harvard Environmental and Energy Economics Workshop (Fall 2021), MIT Social and Engineering Systems Seminar (Spring 2020)

Equity in Adaptation to Fire Risk: Evidence from California Public Safety Power Shutoffs (In progress)
I study how income influences Public Safety Power Shutoffs (PSPS), planned power outages electric utilities use to reduce wildfire risk. I propose a model of PSPS decision-making, and use this to explain how community income may enter the decision process. I then propose an empirical strategy to measure the extent that income influences PSPS decisions. I construct a dataset linking weather, community income, and PSPS decisions for California's three largest investor-owned utilities. I demonstrate a correlation between shutoff decisions and community income - generally, higher income corresponds to fewer outages and a shorter outage conditional on having a shutoff. To focus on how utilities treat communities, rather than other sources of inequality that may place lower-income communities in higher-risk areas, I repeat this analysis after controlling for weather variation.
Presented at Harvard Environmental and Energy Economics Workshop (Spring 2022)

The Changing Role of Coal-fired Generation in the Western Interconnection (2017; with Maury Galbraith, Dian Grueneich, and Ben Lim)
Electric system operators have provided anecdotal evidence that in the 21st century, coal-fired generation is transitioning from providing baseload power to meeting demand more flexibly. We support these claims with an analysis of coal plant generation schedules in the American West. Using a nonparametric clustering algorithm on hourly emissions data from the EPA, we demonstrate that baseload operation in coal plants in the Western Interconnection decreased from 52% of operating days in 2000 to only 22% of operating days in 2016, and that the number of coal plants that spent the majority of their operating days providing baseload power declined over 75% over the same period.
Work completed at the Western Interstate Energy Board, 2017.
Presentation available here: https://westernenergyboard.org/2017/08/wieb-webinar-on-the-role-of-coal-in-the-west/

Teaching	TA for 17.310, Science, Technology and Public Policy	2022
	TA for IDS.131 and IDS.131X, Statistics, Computation and Applications	2021
	TA for 6.431X, Probability	2020
	Tutor in Probability and Statistics, Stanford Office of Accessible Education	2016-2017
Fellowships	MIT Center for International Studies Summer Study Fellowship	2021
	U.C. Berkeley/Sloan Summer School in Environmental and Energy Economics Diversity Fellowship	2020
	MIT Exxon Mobil Energy Fellow	2019-2020
	MIT Presidential Fellow	2017-2018
Service	Organizing Committee, IDSS Graduate Application Assistance Program	2020-2021
	Leadership Committee, MIT Energy for Human Development	2018-2020
	SES Student Representative, IDSS Student Council	2018-2019
Citizenship	U.S., Germany	
Languages	English (native), German (conversational)	
Coding	Python, MATLAB, Julia, Stata, C#/C/C++	