Dan Ai

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Education

University of Massachusetts Amherst — USA
Ph.D. Candidate, Resource Economics

Macau University of Science and Technology, — China
M.S., Applied Economics

Langfang Normal University — China
B.S., Computer Science and Technology

Fields

Applied Microeconomics
Applied Econometrics
Energy Economics
Environmental Economics

Job Market Paper

Data Centers and Transmission Constraints [*Job Market Paper*]
With Christine L. Crago and Matt Woerman

Abstract: The rapid growth of artificial intelligence (AI) and cloud computing has made data centers one of the fastest-growing sources of electricity demand in the United States. We construct a spatial dataset linking data centers and electricity generator nodes through the transmission network and estimate the effect of data center expansion on electricity grid congestion from 2018 to 2025. Leveraging variation in generator nodes' exposure to data center capacity and an instrumental variable strategy, we find that data center expansion affects congestion at both nearby nodes and more distant nodes. A 100 MW data center connected near a generator node increases the node's congestion cost by $6.5/MWh, and the effect declines with distance.

Publications

Ai, D., Christine L. Crago, and Jamie T. Mullins (2026). "Heat, Power Outages, and Mortality in the United States." *Journal of Environmental Economics and Management*, 137, 103275.

Hsiao, C.Y., D. Ai, X. Wei, and N. Sheng (2021). "The Contagious Effect of China's Energy Policy on Stock Markets: The Case of Solar PV Industry." *Renewable Energy*, 164, 74–86.

Working Papers

Disparities in Power Outage Experience in the United States
With Christine L. Crago, Zeal Shah, and Jay Taneja
(Best Student Conference Paper, Northeastern Agricultural and Resource Economics Association (NAREA), 2024)

Abstract: Climate change has increased the frequency and severity of extreme weather events, thereby posing a challenge to electrical grids. Here, we study the distribution of power outages in the United States (US) and employ a two-way fixed effects model to examine the relationship between power outages and indicators of social vulnerability, including poverty, the share of racial minorities, and English deficiency. We employ a dataset of power outages from 2017 to 2021 at the county level and classify them into weather-related and non-weather-related outages. Our main finding identifies disparities in the reliability of power supply. A percentage point increase in the proportion of racial minorities in a county is associated with a 6.37% increase in the average duration of the power outage per customer. Notably, our findings highlight the pronounced disparities associated with weather-related power outages. For weather-related outages, the same percentage point increase in the racial minority share is associated with a 37.93% increase in the average duration of the power outage per customer, controlling for environmental and other factors affecting outages. Our study proposes effective policies to address inequities in the reliability of electricity supply, particularly in the face of increasing impacts of climate change.

Work in Progress

Data Centers and Water Temperatures
With Yingyi Jin, Christine L. Crago, David Keiser, and Tihitina Andarge

Do Data Centers Warm Their Neighborhoods?
With Wenxiu Teng

Private Arbitrage and System Efficiency: Battery Storage in Electricity Markets

Fellowships & Awards

Graduate Fellows Travel Grant, UMass Amherst 2025
Carolyn Harper Outstanding Research Award, UMass Amherst 2024
Best Student Conference Paper, Northeastern Agricultural and Resource Economics Association (NAREA) 2024
Graduate Fellows Travel Grant, UMass Amherst 2024
Research Enhancement and Leadership (REAL) Fellow, UMass Amherst 2021–2025

Teaching

Instructor of Record, University of Massachusetts Amherst
Price Theory Fall 2025

Guest Lecturer, University of Massachusetts Amherst
Cost Benefit Analysis Fall 2025
Intermediate Statistics for Business and Economics Fall 2026

Teaching Assistant, University of Massachusetts Amherst
Cost Benefit Analysis Spring 2026
Financial Analysis for Consumers and Firms Spring 2026
Managerial Economics Fall 2024
Intermediate Statistics for Business and Economics Fall 2022, Spring 2023, Fall 2026
Introductory Statistics for the Social Sciences Fall 2021, Spring 2022, Fall 2024, Spring 2025

Seminars & Conferences

UMass Energy Transition Symposium
Amherst, MA May 2026
Northeastern Agricultural and Resource Economics Association final(NAREA) Annual Meeting and Workshop
Burlington, VT June 2025
Association of Environmental and Resource Economists (AERE) Summer Conference
Santa Ana Pueblo, NM May 2025
UMass Energy Transition Symposium
Amherst, MA May 2025
Sloan/Haas Summer School in Environmental and Energy Economics
University of California, Berkeley, CA August 2024
Northeastern Agricultural and Resource Economics Association (NAREA) Annual Meeting and Workshop
Rehoboth, DE June 2024
UMass Energy Transition Symposium
Amherst, MA May 2023

Affiliations

Elevating Equity Values in the Transition of the Energy System (ELEVATE) Program, funded by the U.S. National Science Foundation (NSF)

Programming Skills

Java, Python, R, Stata, ArcGIS Pro, LaTeX, Google Earth Engine

Languages

English (Fluent), Chinese (Native)

Citizenship

Chinese

References

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