

Daniel Guth

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EDUCATION

California Institute of Technology, Pasadena, CA

Doctor of Philosophy, Social Science

Expected June 2023

Master of Science, Social Science

June 2019

Bachelor of Science, Mathematics

September 2012 - June 2016

RESEARCH INTERESTS

- Applied Microeconomics, Health Economics, Environmental Economics, Machine Learning

PUBLICATIONS

Chiang, M., Guth, D., Pardeshi, A., Randhawa, J., Shen, A., Shan, M., Dredge, J., Nguyen, A., Gokoffki, K., Wong, B., Song, B., Lin, S., Varma, R., Xu, B. (2021) Glaucoma Expert-level Detection of Angle Closure in Goniophotographs with Convolutional Neural Networks: The Chinese American Eye Study, *American Journal of Ophthalmology* 226 (2021): 100-107. [Link Here.](#)

Port, A., Gheorghita, I., Guth, D., Clark, J. M., Liang, C., Dasu, S., & Marcolli, M. (2018). Persistent topology of syntax. *Mathematics in Computer Science*, 12(1), 33-50. [Link Here.](#)

JOB MARKET PAPER

Air Pollution and School Absences in New York City, Daniel Guth

Abstract: In this paper, I analyze the effects of changes in day-to-day air pollution levels on daily absences for New York City schools. I combine EPA air quality data from monitoring stations with absences from 2006 to 2019 across more than 1600 schools. To alleviate endogeneity concerns I use wind as an instrument because air flow is correlated with air quality, but the specific direction that the wind is blowing each day is due to external climate forces and thus quasi-random. With an average of approximately 8% students absent per day across NYC, I estimate that an additional $1 \mu\text{g}/\text{m}^3$ of PM2.5 pollution increases absences across all schools by 0.044%, and an extra part-per-billion (PPB) of Ozone increases it by 0.029%. Pollution has the largest effects on elementary and middle school children, and schools with more impoverished students have more absences caused by pollution. Examining trends across 14 years of pollution and absences, my results suggest that the decrease in average daily pollution of $5 \mu\text{g}/\text{m}^3$ PM2.5 from 2006 to 2019 led to at least 0.22% fewer absences across NYC schools every day. This work shows the improvements over time in air quality in New York City but also highlights the disparate impacts of air pollution.

WORKING PAPERS

Geographic Spillover Effects of Prescription Drug Monitoring Programs (PDMPs), Daniel Guth and Shiyu Zhang, [Link Here.](#)

Abstract: Prescription Drug Monitoring Programs (PDMPs) seek to potentially reduce opioid misuse by restricting the sale of opioids in a state. We examine discontinuities along state borders, where one side may have a PDMP and the other side may not. We find that electronic PDMP implementation, whereby doctors and pharmacists can observe a patient's opioid purchase history, reduces a state's opioid sales but increases opioid sales in neighboring counties on the other side of the state border. We also find systematic differences in opioid sales and mortality between border counties and interior counties. These differences decrease when neighboring states both have ePDMPs, which is consistent with the hypothesis that individuals cross state lines to purchase opioids. Our work highlights the importance of understanding the opioid market as connected across counties or states, as we show that states are affected by the opioid policies of their neighbors.

The OxyContin Reformulation Revisited: New Evidence From Improved Definitions of Markets and Substitutes, Shiyu Zhang and Daniel Guth, [Link Here.](#)

Abstract: The opioid epidemic began with prescription pain relievers. In 2010 Purdue Pharma reformulated OxyContin to make it more difficult to abuse. OxyContin misuse fell dramatically, and concurrently heroin deaths began to rise. Previous research overlooked generic oxycodone and argued that the reformulation induced OxyContin users to switch directly to heroin. Using a novel and fine-grained source of all oxycodone sales from 2006-2014, we show that the reformulation led users to substitute from OxyContin to generic oxycodone, and the reformulation had no overall impact on opioid or heroin mortality. In fact, generic oxycodone, instead of OxyContin, was the driving factor in the transition to heroin. Finally, we show that by omitting generic oxycodone we recover the results of the literature. These findings highlight the important role generic oxycodone played in the opioid epidemic and the limited effectiveness of a partial supply-side intervention.

WORKS IN PROGRESS

- **Longitudinal Trends in Resource Utilization Associated with Newly Diagnosed Primary Angle Closure Glaucoma in the United States**, Daniel Guth, Galo Apolo, Seth A. Seabury, Khristina Lung, Brian Toy, Benjamin Y. Xu,

TEACHING EXPERIENCE

- Completed Caltech's Center for Teaching, Learning and Outreach (CTLO) Certificate of Practice in University Teaching.
- Gave recitations on game theory and political models, and created problem and solution sets for **Political Science 12** in the Fall of 2018 and 2020. Graded problem sets and held office hours for a 'flipped classroom' introductory class **Economics 11** Winter of 2021.
- Helped design a new data methods course **Social Science 224** for graduate students, and was the teaching assistant who ran the computational labs in Fall 2019, Winter 2020 and Fall 2021.

CONFERENCE PRESENTATIONS

- **2023:** (Upcoming) ASSA Poster Presentation
- **2021:** ASHEcon Online Graduate Student Presentation, North American Meeting of Urban Economics Association Panel