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Education

Ph.D., Economics, Duke University, 2023 (Expected)
Committee: Jason Baron, Pat Bayer (Co-Chair), Jimmy Roberts, Chris Timmins (Co-Chair)
M.A., Economics, University of California, San Diego, 2019
M.S., Agricultural, Food, and Resource Economics, Michigan State University, 2016
B.A., Economics & B.S., Health Science, Boston University, 2009

Fields of Specialization

Public, Health, Urban, and Crime

Research

Job Market Paper

Disrupting Drug Markets: The Effects of Crackdowns on Rogue Opioid Suppliers

Abstract: More than 564,000 Americans have died from an opioid-related overdose since 1999. In this paper, I estimate the impacts of enforcement actions taken against doctors on the supply of prescription opioids, black-market prices, and health outcomes. Exploiting plausibly exogenous variation in the timing and location of controlled substance license audits, I find that cracking down on a single doctor decreases county-level opioid dispensing by 10%. This decline in legal supply persists across space and time and results in a 44% increase in the black-market pill price. Significant heroin substitution also occurs, yet for each additional heroin overdose death, there are two fewer non-heroin opioid overdose deaths. The mortality declines are strongest among young and prime-aged men. These results highlight a novel tradeoff policymakers should consider when attempting to address drug abuse through targeted supply-side enforcement: reductions in the flow of new users must be balanced against the harm that arises when existing users substitute to more dangerous drugs.

Publications

Crime and (a Preference for) Punishment: The Effects of Drug Policy Reform on Policing Activity, *The Journal of Law and Economics*, 2022.

Abstract: We still know very little about the incentives of police. Using geocoded crime data and a novel source of within-city variation in punishment severity, I am able to shed light on enforcement behavior. I find that in parts of a city where drug sale penalties were weakened, there is a 13% decrease in all drug arrests. There is no displacement of non-drug offenses. If offenders were significantly deterred by harsher penalties, as the law intended and Becker's (1968) model predicts, drug arrests should have increased in areas with weaker penalties. My results are therefore consistent with police

treating enforcement effort and punishment severity as complements. I also find that city-wide crime and drug use do not increase after the reform. This paper thus calls into question the “War on Drugs” view of punishment and suggests that certain types of enforcement can be reduced without incurring large public safety costs.

Prescriptive Drought Policy and Water Supplier Compliance, *Ecological Economics*, 2022.

Abstract: Governments often cannot use prices to induce water conservation, and the need to understand the impacts of alternate methods is growing due to increased variability in water resources. During the 2012-2016 drought in California, a period that may presage the future of water management in a warmer climate, the state attempted to manage water use through a set of mandatory restrictions that assigned each of California’s 412 largest urban water suppliers to one of nine conservation tiers; those with greater historic usage needed to conserve more. I find that even though significant statewide savings occurred, only half of all suppliers complied with their conservation target. Moreover, the increased savings were not caused by the tiered design of the mandate: evidence from a regression discontinuity design shows that suppliers that just missed a stricter conservation tier actually conserved more. Additionally, water use rebounded after the regulation was removed, implying that variable adjustments in demand contributed more to water use savings than fixed cost household investments. Given the significant costs of water regulation and the high probability of future droughts, the policy implication is that both governments and water suppliers may benefit from investments in water supply reliability and less complex prescriptive policies.

Working Papers

Rebel Funding Strategies: Illicit Activities, Natural Resources, and Substitution Behavior

Abstract: Rebel groups often exploit natural resources in order to finance their operations, yet we still know little about their basic funding decisions. Given the prevalence of asymmetric warfare, I examine how rebel groups choose between funding strategies using a unique panel dataset on the activities of 297 groups. I find that when the world price of a natural resource they exploit rises, rebel groups substitute away from extortion, smuggling, kidnapping, and theft. These results suggest that policies attempting to shut down these groups by cutting their main sources of funding may produce harmful unintended consequences in the short run.

Work In Progress

Pill Mills and Corner Crews: Estimating the Elasticity of Substitution between Legal and Illegal Markets (with Stephen Billings, Jesse Bruhn, and Kevin Schnepel)

Summary: There is a widespread perception that prescription opioids serve as a gateway to illegal heroin consumption. In this paper, we unite high quality administrative data on pharmacy level opioid shipments with maps of gang territory from the Chicago Police Department to explore the interplay between legal and illegal markets. Relative to a comparison group, pharmacies that become occupied by gangs see a sharp increase in suspicious opioid dispensing. We also find that the reformulation of Oxycontin caused a sharp rise in reported heroin crime in neighborhoods occupied by gangs with Mexican cartel affiliation relative to neighborhoods occupied by gangs that did not. These preliminary findings suggest that the rise of the opioid epidemic was facilitated by tight vertical supply chains linking legal and illicit industries, and further exacerbated by substantial substitution from Oxycontin to heroin use in response to a policy intended to deter abuse. Our findings highlight the difficulty and complexity of formulating welfare improving policy in the presence of illegal markets.

School Funding, Accountability, and the Opioid Epidemic (with Jason Baron and Brian Jacob)

Summary: Test scores in the United States increased dramatically from the mid-1990s through 2010, but have stagnated since. Moreover, the performance of the lowest achieving students (the 10th and

25th percentiles) has declined notably since around 2010. Observers offer many explanations for this puzzle, such as shrinking education funding, the rollback of federal accountability policy and the spread of opioid abuse. In this project, we examine the role of each of these three factors. In particular, we provide new evidence on how the opioid epidemic influenced national achievement trends.

The Effects of Changing Felony Theft Thresholds (with Steve Billings and Kevin Schnepel)

Summary: Racial differences in criminal justice contact are a persistent concern and past research often focuses on violent interactions with the police or criminal case outcomes. In this project, we focus on police enforcement for one of the most common victimizations in the US - property crime. More specifically, we examine differences in reported values of stolen goods by race of victim and exploit policy changes in felony thresholds. After the threshold is increased, we find greater bunching for black victims right before the threshold and for white victims right after the threshold. We link this pattern to crime clearance and highlight a pattern of crime reporting in which white victims are more likely to report felony property crimes and thus receive more police resources in solving these crimes as well as increase the likelihood of more severe punishment for offenders. As the underlying composition of property crime did not change, this result suggests that police substitute enforcement effort towards pursuing high-value property crime for white victims. This pattern of crime reporting and clearance has broader implications for a victim's sense of satisfaction with police services as well as an offender's punishment for a property crime.

Master's Thesis

To What Water Price Do Consumers Respond? A Study of Increasing Block Rates and Mandatory Water Restrictions

Thesis Committee: Soren Anderson, Ken Baerenklau, Joe Herriges, Nicole Mason

Research Positions

Research Assistant, Jason Baron, Duke University, 2021 - Present

Research Assistant, Erica Field, Duke University, 2020 - 2021

Research Assistant, Food Security Group, Michigan State University, 2014 - 2016

Professional Development and Teaching

Duke University

Preparing Future Faculty Program, 2022 - 2023

Teaching on Purpose Fellowship, 2022

Certificate in College Teaching, 2022

Instructor of Record, Stata for Economics PhD Students (Graduate Course), Summer 2022

Head Teaching Assistant, Probability and Statistics (Undergraduate Course), Fall 2019

International School of Choueifat, Dubai, United Arab Emirates

Teacher, Mathematics (Grades 3 - 7) & Economics (Grade 11), 2009 - 2011

Honors and Awards

Research Fellowship, The Graduate School, Duke University, Summers 2020, 2021, & 2022

Graduate Fellowship, Department of Economics, Duke University, 2019 - 2020

Graduate Research and Travel Award, International Institute, UC San Diego, Summer 2019

San Diego Fellowship, Program for Interdisciplinary Environmental Research, UC San Diego, 2017 - 2019

Schmid Fellowship in Institutional Economics, Michigan State University, 2015

Best Primary School Mathematics Teacher, International School of Choueifat, Dubai, United Arab Emirates, 2010 - 2011

Presentations

2023: LSE-CEP Policing and Crime Workshop, Workshop on the Economics of Crime for Junior Scholars, Conference on the Economics of Crime and Justice at the Becker Friedman Institute

2022: Southern Economic Association, UNC Wilmington, Association for Mentoring and Inclusion in Economics: 2nd Workshop in Applied Microeconomics, UNC Greensboro, NBER Summer Institute (Invited), Western Economic Association International, Carolina Region Empirical Economics Day, ASSA 2022 Annual Meeting (Poster Presenter, Online)

2021: Workshop on the Economics of Crime for Junior Scholars (Online), 2021 APPAM Fall Research Conference, Urban Economics Association (Online), Carolina Region Empirical Economics Day (Online), Eastern Economic Association (Online)

Workshops

Summer School in Marine Biodiversity, Conservation, and Global Change, UC San Diego, Summer 2018

Summer School in Environmental and Energy Economics, UC Berkeley, Summer 2016

Personal

Citizenship

USA, Egypt

Languages

English (Native), Spanish (Proficient), Arabic (Conversational)

References

[Jason Baron](#), Assistant Professor, Department of Economics, Duke University

[Patrick Bayer](#), Professor, Department of Economics, Duke University

[Stephen Billings](#), Associate Professor, Leeds School of Business, University of Colorado at Boulder

[James Roberts](#), Professor, Department of Economics, Duke University

[Christopher Timmins](#), Professor, Department of Economics, Duke University

Policy Work

Water Policy Center Intern, Public Policy Institute of California, Summer 2015

[“Reducing the Costs of Drought: Lessons from Australia,”](#) September 2015

[“What if California’s Drought Continues,”](#) August 2015

[“The ‘Inexact Science’ of Water Pricing,”](#) July 2015

Field Work

Accra, Ghana (Scoping Visit), November 2019

Huambo, Angola (10 enumerators, 404 households, 3 weeks), January 2015

Durban, South Africa (20 enumerators, 4007 households, 11 weeks), Summer 2013

Development Reports

“Raising the Incomes of Smallholder Farmers in the Central Highlands of Angola: A Model Project for Improving Agricultural Value Chains in Post-Conflict Nations,” (with Eunice Cavane and Cynthia Donovan), prepared for Bill & Melinda Gates Foundation and World Vision, June 2015.

“Economic Benefits of the Wonderbag Cooking Technology: An Impact Assessment,” (with David Roland-Holst and John Wisniosk), Center for Energy, Resources, and Economic Sustainability Research Paper No. 14012601, UC Berkeley, January 2014.