

DSPC 7514 Data Analysis for Policy Research

Instructor: Harold Stolper

Lectures 6 & 7: Detroit Water Shutoffs

Policy Context and Data Overview

Note: this data exercise was adapted from research and analysis from Samuel Stolper at the University of Michigan

Research questions:

- Which populations are most affected by the city of Detroit shutting off household water access?
- What are the associated health impacts, i.e., what is the causal effect of water shutoffs on public health outcomes?

Policy context

Water affordability is an acute problem in Detroit due to a number of factors – aging infrastructure, declining federal funding for water infrastructure, a 2013 municipal bankruptcy, declining economies of scale, and persistent and rising inequality and poverty. In particular, depopulation and white flight (to the suburbs) have resulted in a system of water distribution to fewer people over a more expansive geographic area, leading to extremely high per-unit costs.

One of the worst manifestations of unaffordable water is a shutoff – a disconnection of water service for non-payment. In theory, they help water utilities recover their costs by raising revenue collection through the threat of disconnection and not sending water that might not get paid for. However, they have adverse consequences for educational access, home values/foreclosures, mental and physical health, sanitary conditions at both the individual and neighborhood level. Though municipal authorities have typically ignored advocates of income-based water pricing (to address the underlying affordability problem), Detroit has extended a moratorium on utility shutoffs across Michigan through 2021.

Data

This is a two-week exercise. In the first week, we'll investigate which communities were most affected and when, using monthly *census tract-level* demographic data from the American Community Survey (ACS) and service interruptions (SI) microdata – i.e., water shutoff records. In principle, tract level income should be negatively correlated with water shutoffs for non-payment, stronger than the correlation between racial composition and water shutoffs.

In the second week, we will examine the association between shutoffs and public health outcomes at the *zip code-level* (joining zip-code level demographic data to data on public health records (hospitalizations and hospitalizations related to viral infections), as well as home vacancy data from the US Department of Housing and Urban Development (HUD)).

Methods

We'll start with a cross-sectional exploration of the relationships between tract-level income, race and shutoffs, using data visualization techniques we've already used in other examples. We can do the same for health outcomes and shutoffs. Next, we'll conduct a preliminary

econometric analysis of the impacts of shutoffs on public health impacts, *exploiting variation in shutoffs over time within zip codes* by relying on zip code and month fixed effects, as well as other controls. We'll discuss how close this gets us to estimating arguably causal effects and highlight critical issues with this *two-way fixed effects* (TWFE) approach in contexts where the timing and intensity of the treatment varies across entities.

Why should we care?

Presenting quantitative evidence on the negative impacts of water shutoffs (and disparate impacts based on race) can help drive action and reform towards more equitable water access. This is particularly useful in the context of a city that has been historically slow in responding to an underlying affordability problem and stark racial disparities.