



# Google Earth Engine and Neighborhood Change: A New York City Case Study



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## Introduction/Motivation

- There has been an increasing use of use of geospatial data in economics:
  - Causal inference for spatial treatments, Pollman (2023)
  - Microspacial economic growth, Khachiyani et al. (2022)
  - Local labor markets, Autor et al. (2013)
  - Macroeconomic identification, Nakamura and Steinsson (2018)
  - Neighborhood gentrification, Ferreira et al. (2023)
  - Residential segregation, Logan and Parman (2017)
- Google Earth Engine (GEE) is a cloud-based and open-source option when accessing and processing satellite imagery and geospatial data.

## What We Do

- Explore the usefulness of Google Earth Engine (GEE) as a geospatial tool for economic analysis of neighborhood change in New York City.

## What Is Neighborhood Change

- Neighborhood change is any housing AND demographic process.
- It is the result of an outward or inward shift in the demand curve and/or supply curve for the quantity or quality of housing in a particular neighborhood.

## Geographical Unit of Analysis

- Over the past twenty years studies of neighborhood change have used census tracts as a proxy for neighborhoods.
- We use public use data from 2020 for three geographic units in descending object size:
  - Census tract - subdivisions of a county (or equivalent).
  - Census block - smallest unit of census geography (subdivision of a tract or equivalent).
  - NYC OpenData building footprints - annually captured aerial imagery represents the perimeter outline of each building as viewed from directly above.<sup>1</sup>
  - NYC OpenData historical district maps - drawn to conform to the the New York City basemap.

## Findings/Future Work

- GEE's usefulness is mixed:
  - Census tracts, blocks, and NYC OpenData building footprints:
    - All publicly available and easy to import.
    - Some blocks intersect with more than one tract.
    - Building footprints have poor coverage - 13/39 or approximately 1/3 of the structures found in block 3000.
  - NYC OpenData historical district maps:
    - Publicly available, easy to import, and accurate.
    - Intersect tracts and blocks in non-uniform ways => **create an object for each building/structure and input data manually.**

All references are available on request.

Figure 1 - Census Block Subdivisions & Tract 179 in Ft. Greene Brooklyn, NY



Note: This figure shows the location of census block subdivisions (red boundaries), census tract 179 (black boundary), and block 3000 (blue boundary labeled Z) Ft. Greene Brooklyn, NY. X and Y (purple boundary) shows that blocks can intersect with more than one tract.

Figure 2 - Ft. Greene Historic District and Census Block 3000



Note: This figure shows census block 3000 (red boundary), Ft. Greene historic district (blue boundary), and building footprints (yellow boundaries). Historic district intersects block 3000 non-uniformly and building footprints cover 13 out of 39 buildings/structures located on the block.