# The Impact of Urban Growth Boundaries on Development Density and Housing Prices

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- UGBs are perceived by many to limit housing supply and drive up home prices

# Research question

- **How do UGBs affect the density of land development patterns?**

  - Recently-released gridded (250m) database on land development from 1945-2015 (70 years) for 215 cities in Oregon

  - Estimate effect on land development near UGB using a spatial regression discontinuity (RD) design

# Institutional setting

- Oregon has a statewide UGB policy that applies to all cities/towns

- State legislation in 1973 (SB 100) led to 17 land-use planning goals
  - Primary urbanization goal: *"To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities"*

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- Mandated that <u>all</u> cities and towns set a UGB by 1980
- Initial UGBs should provide for 14-20 years of anticipated population growth $\rightarrow$ permitted to expand over time
- UGB expansion: local governments must demonstrate a need for new developable land and show that such development could not easily take place on land inside the current UGB
    - Total expansions to date amount to $\approx$ 10% of original area $\rightarrow$ OR's population has grown by $\approx$ 60%

# UGBs apply to every city and town in Oregon
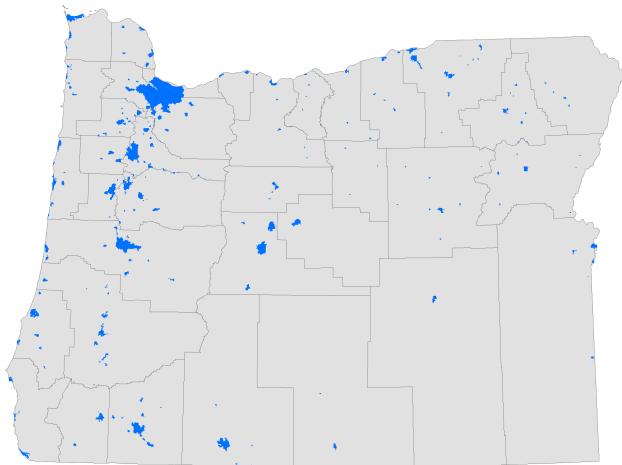
# Primary data sources

- UGB boundary shapefiles from Oregon's Department of Land Conservation and Development
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- Land development data from the Historical Settlement Data Compilation for the United States (HISDAC-US) database (Leyk and Uhl 2018; Uhl et al. 2021)

  - 250m resolution ($\approx$ 15 acres)

  - Count of distinct built-up property locations (buildings) per plot every 5 years over 1810–2015 $\rightarrow$ we use data from 1945-2015

  - Backbone of HISDAC-US is "year-built" attribute in Zillow's Transaction and Assessment Dataset (ZTRAX)
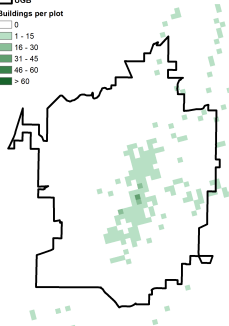
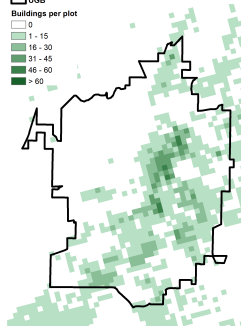# Illustration of HISDAC density data for Bend, OR
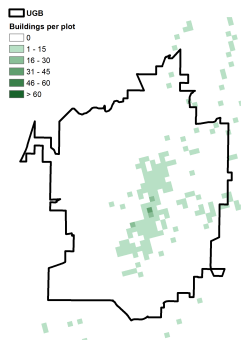


1945 (Pre-UGB)

Color bins are set at 15 buildings. Since plots are 15 acres: lightest bin is
0-1 buildings per acre, 2nd lightest bin is 1-2 buildings per acre, etc.

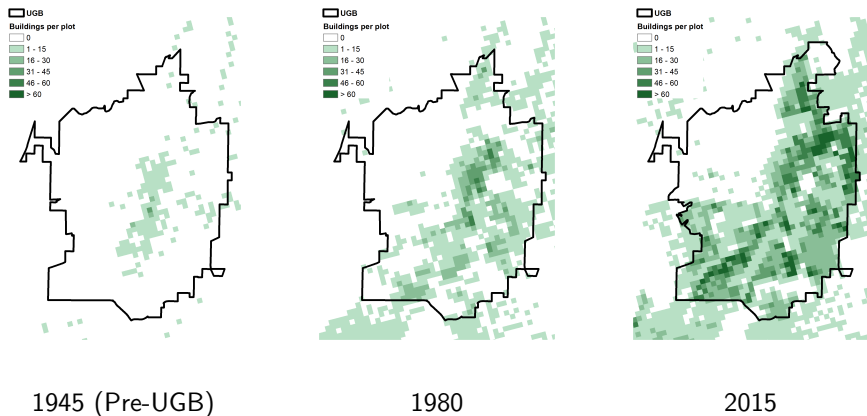# Illustration of HISDAC density data for Bend, OR



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    - Drop plots that fall on UGB
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- Stack the 215 UGB-specific panels:
    - Plots can enter stacked dataset multiple times if outside $> 1$ UGB
    - Unit of observation is plot-UGB-year combination
    - Distance to UGB (can be) time-varying as UGBs expand
    - 3.6 million total observations in dataset (250k per year)

# Cross-sectional spatial regression discontinuity design

$$Y_p = \tau\, UGB_p + \gamma\, UGB\, dist_p + \phi(UGB_p * UGB\, dist_p) + \beta \mathbf{X_p} + \epsilon_p$$

- $Y_p$: building density measured at plot level $p$ (cross-sectional model)
- $UGB_p$: indicator for whether plot is inside UGB
- $UGB\, dist_p$: distance from UGB (running variable; $> 0$ if $UGB_p = 1$)
- $\mathbf{X_p}$: Controls for slope, elevation, soil class, and UGB dummies
- Cluster the standard errors by UGB

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- Follow Cattaneo et al. (2020) and use a nonparametric RD approach:
    - Use a local linear regression to estimate left and right limits of $UGB\, dist_p$ at boundary
    - $\hat{\tau}$ is estimated by taking the difference in $\hat{Y}_p$ at UGB border
    - Use triangular kernel with optimal MSE-based bandwidth
- Estimate RD for overall sample and separately for plots (1) inside UGB and inside city limits and (2) inside UGB but outside city limits
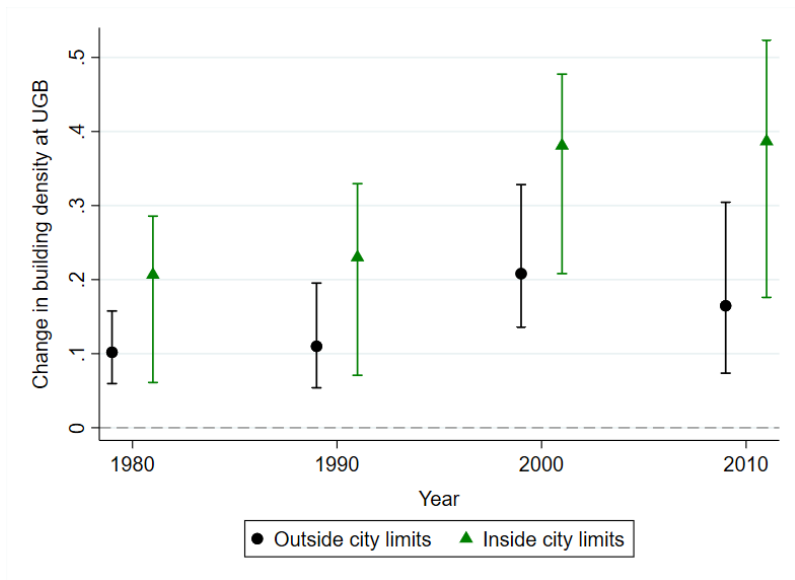
# Building density RD estimate for 2015 (no city limits distinction)



RD estimate = 0.216 (p = 0.015)
Left N = 6951
Right N = 5667
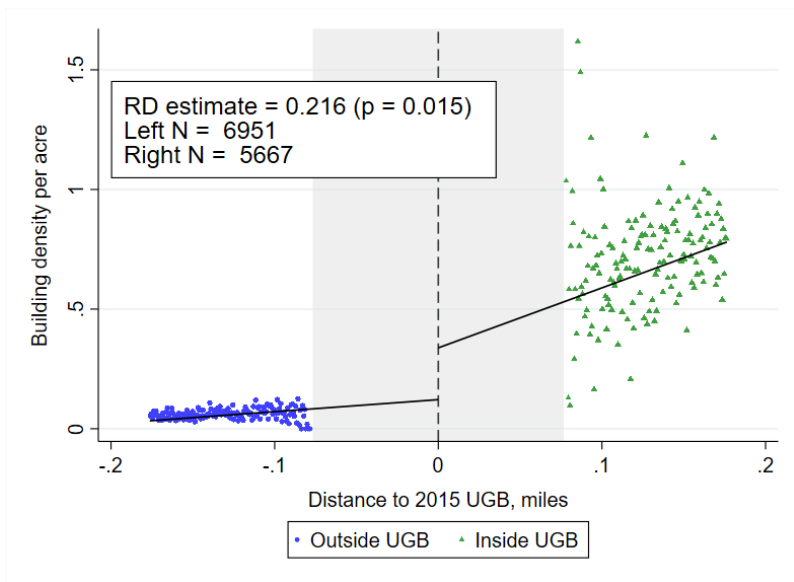
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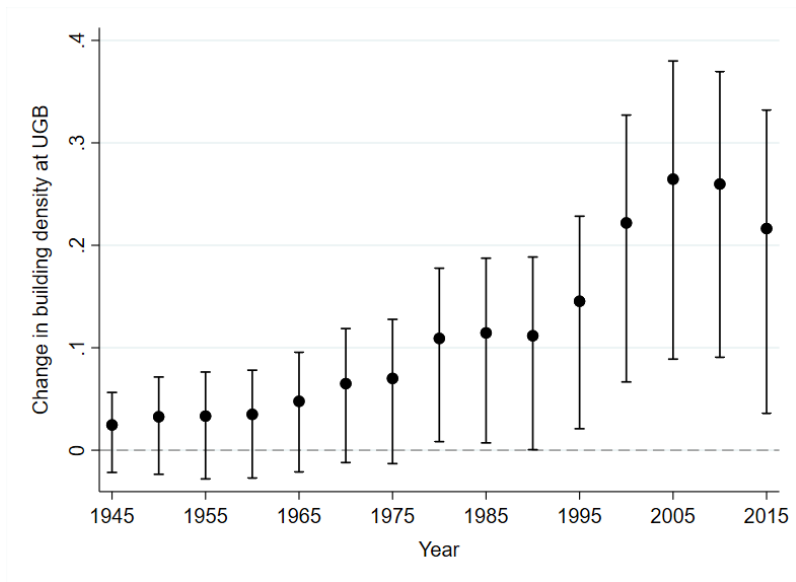
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- UGBs should also influence building density closer to the urban core –
  - $\rightarrow$ Can exploit UGB expansions as source of variation or potentially cross-state comparisons

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- Estimate separate models by city size and other sources of heterogeneity
- By definition, RD estimates are local to the boundary
- UGBs should also influence building density closer to the urban core –
  - → Can exploit UGB expansions as source of variation or potentially cross-state comparisons
- Next step in larger project: Estimate impact on home prices
  - → Assembled large database of repeat sales transactions in OR
  - → Similar research design to that of UGB density analysis away from the boundary

# Thank you!

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Evaluation and feedback for OSU Extension: