# RIDING TANDEM

## *Does cycling infrastructure investment mirror gentrification and privilege in Portland, OR and Chicago, IL?*

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## ABSTRACT

While **cycling** has become more popular as an environmentally and socially conscious mode choice, it is also viewed as a keystone activity of the demographic often present in the **first waves of gentrification.**

This research assesses the **geographic distribution** of **cycling infrastructure** with regard to **community demographics** to better understand claims that cycling infrastructure investment is associated with incoming populations of privilege or neighborhoods of existing privilege.

## METHODOLOGY

This study uses:
- 1990 and 2010 census data at the census tract level
- Municipal cycling infrastructure data

**Linear regression models** are used to assess relationships between **cycling infrastructure investment** and **community composition** variables while accounting for population density, proximity to downtown, and proximity to transit.

**The dependent variable** (cycling infrastructure investment) is the sum of the z-scores of the following elements normalized by census tract area:
- change in km bicycle lanes from 1990 to 2010,
- current bicycle parking facilities, and
- current bicycle share stations (Chicago only),

normalized by census tract acrea.

### LINEAR REGRESSION MODEL VARIABLE DEFINITIONS

Independent Variables

| | 2010 Conditions | Change in community composition 1990-2010 | Description and expected associations | Expected model relationship |
|---|---|---|---|---|
| **Distance (constant 1990-2010)** | Distance to downtown** | N/A | Proximity to downtown (km) is expected to be associated with increased cycling infrastructure. | – |
| | Distance to transit | N/A | Distance (km) from the census tract centroid to the nearest transit station (CTA, TriMet MAX or Portland Streetcar) is expected to relate to increased cycling infrastructure. | – |
| **Population density** | Population density** | Change in population density* | A positive change in population density is expected to reflect an increase in cyclists and, by extension, cycling infrastructure supply. | + |
| **Gentrification indicators** | % non-White* | Change in % White population* | An increase in White population concentrations is associated with gentrification. | + |
| | % renter occupied units* | Change in % homeownership* | High rentership rates are an indicator that gentrification may occur, followed by a switch from renting to homeownership. | + |
| | % with some college or higher* | Change in % with some college or higher* | Higher educational attainment is associated with gentrification. | + |
| | %new resident since 2009* | N/A | High mobility, whether through displacement or in-migration, is associated with gentrification and changing community composition. | + |
| | Median home value (per $1000)* | Change in median home value (per $1000)* | An increase in housing costs is associated with gentrification. | + |
| | % unemployed (civilian labor force)* | not available 1990 | A decrease in unemployment is associated with gentrification and is expected to be associated with increased cycling infrastructure. | – |
| | Median household income (per $1000) | Change in median household income (per $1000) | Increased affluence is associated with gentrification and is expected to be associated with increased cycling infrastructure. | + |
| | Median age | Not available 1990 | Lower median age is associated with gentrification and is expected to be associated with increased cycling infrastructure. | – |
| | Median age^2 | N/A | Median age squared is used to reflect the non linear relationship with the dependent variable in the linear model | – |

* indicates the variable is significant in one model
**indicates the variable is significant in both models

## ANALYSIS

### PORTLAND REGRESSION MODEL

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. |
| (Constant) | -0.163 | 0.408 | | -0.4 | 0.69 |
| Population density 2010 | 73.963 | 26.825 | 0.154 | 2.762 | 0.007 |
| Distance to downtown (km) | -0.228 | 0.03 | -0.511 | -7.539 | 0 |
| Change in % homeowner 1990-2010 | 2.916 | 1.108 | 0.156 | 2.631 | 0.009 |
| Change in % with some college or higher 1990-2010 | 3.08 | 0.954 | 0.193 | 3.227 | 0.002 |
| % renter occupied units 2010 | 1.582 | 0.601 | 0.187 | 2.633 | 0.009 |
| % unemployed | 3.99 | 1.887 | 0.132 | 2.114 | 0.036 |

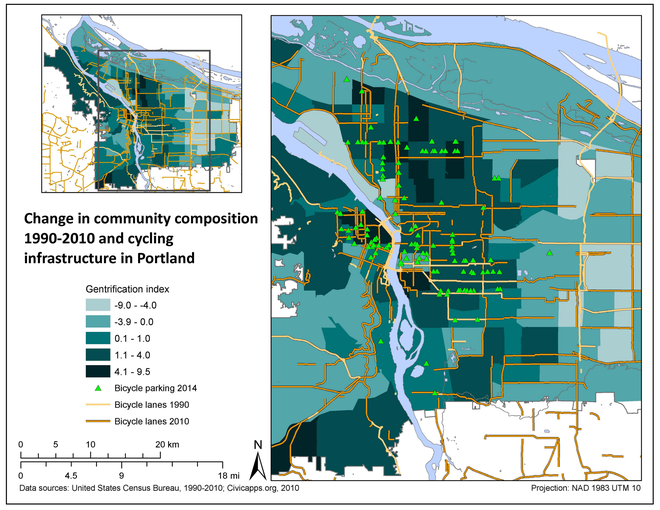
| Summary | N | R | $R^2$ | Adjusted $R^2$ | Std. Error of the Estimate |
|---|---|---|---|---|---|
| | 149 | 0.767 | 0.588 | 0.57 | 1.064 |

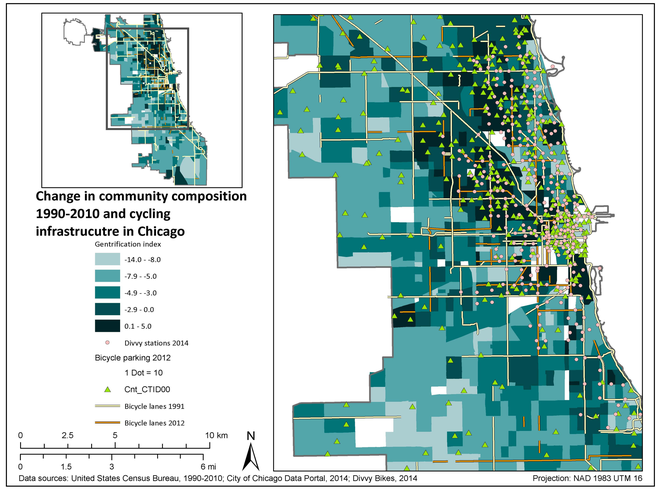
### CHICAGO REGRESSION MODEL

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. |
| (Constant) | -0.779 | 0.309 | | -2.516 | 0.012 |
| Change in population density 1990-2010 | 68.551 | 23.72 | 0.079 | 2.89 | 0.004 |
| Population density 2010 | 99.105 | 17.511 | 0.183 | 5.66 | 0 |
| Distance to downtown (km) | -0.153 | 0.014 | -0.334 | -11.193 | 0 |
| Change in % White 1990-2010 | 1.421 | 0.364 | 0.137 | 3.909 | 0 |
| More than 40% non-White in 1990 | -0.583 | 0.172 | -0.121 | -3.397 | 0.001 |
| Change in % with some college or higher 1990-2010 | -2.052 | 0.509 | -0.144 | -4.033 | 0 |
| % with some college or higher 2010 | 4.483 | 0.414 | 0.44 | 10.824 | 0 |
| % new resident since 2009 | 2.586 | 0.707 | 0.109 | 3.656 | 0 |
| Change in median home value (per $1000) 1990-2010 | 0.002 | 0.001 | 0.177 | 4.053 | 0 |
| Median home value (per $1000) 2010 | -0.003 | 0.001 | -0.219 | -4.003 | 0 |

| Summary | N | R | $R^2$ | Adjusted $R^2$ | Std. Error of the Estimate |
|---|---|---|---|---|---|
| | 844 | 0.683 | 0.466 | 0.46 | 1.642 |

- The models were built step-wise for each city and only significant variables are shown.




## HIGHLIGHT OF FINDINGS

- In both cities, **higher population density** and **less distance to downtown** are associated with higher cycling infrastructure investment.

In Portland:
- an **increase** in **home ownership**,
- an **increase** in population with **college education**,
- a **higher** percent **renter occupied units**, and
- a **higher** percent **unemployment**

are associated with cycling infrastructure investment.

In Chicago:
- an **increase** in **White population**,
- a **population concentration less than 40% non-White**,
- a **decrease** in population with **college education**,
- a **higher** percent **renter occupied units**,
- an **increase** in **median home value**, and
- **a higher median home value**

are associated with cycling infrastructure investment.

- Hwang and Sampson[1] found that **gentrification did not occur** in Chicago census tracts with **greater than 40% non-White populations.** We emulate this finding with a dummy variable, which led to a much stronger model fit.

1 Hwang, J., and R. Sampson. Divergen pathways of gentrification: Racial inequality and the social order of renewal in Chicago neighborhoods. American Sociological Association, Vol. 76, No. 4, 2014, pp. 726-751.

## CONCLUSION

The significant variables in the stop-wise regression models **reflect expected relationships** if cycling infrastructure **investment is biased towards areas of increasing or existing privilege**. The possible exceptions are percent unemployed in Portland, change in college education in Chicago, and median home value in chicago It is possible that these variables are linked to areas in the first stages of gentrification. The findings imply that **marginalized communities may not be as likely to attract cycling investment** without the presence of privileged populations.

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