Factors Associated with the Bicycle Commute Use of Newcomers: An analysis of the 70 largest U.S. Cities

Ryan J. Dann
PhD Student, Urban Studies
Portland State University
May 2014
Newcomers and Bicycles

Factors Associated with the Bicycle Commute Use of Newcomers

Photo Credit: Daveena Tauber
Presentation Outline

– Introduction to Newcomers and Bicycle Use
– ACS data and my study
– Results and implications
– Limitations of ACS data
– My future research and ACS data
Background on Bicycling

- Benefits of bicycling are becoming well known.
- Cities are making substantial investments to encourage bicycle use.
- Levels of bicycle use are increasing.
  - Since 2000, bicycle commuting in the U.S. has increased by 62%\(^1\)
  - Largest percentage increase of all commuting modes
- Some cities are seeing larger increases in bicycle use than others.

\(^1\) 2000 US Census Decennial Survey & 2012 ACS 1-year estimates
Factors Associated with the Bicycle Commute Use of Newcomers

Percent Change in Bicycle Commute Use for Selected Cities, 2000-2011

Newcomers to Portland

Data Source: Workforce Population 2007-11 ACS PUMS 5-year Estimates

All things being equal, the odds of a Portland newcomer (i.e. someone who moved within the past year) bicycling to work were 50% greater than those of a pre-existing resident (Dann, 2014).
Newcomers in Major U.S. Cities


<table>
<thead>
<tr>
<th>Newcomer Population</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

Newcomers Share: 70 Largest U.S. Cities, 2007-2011

<table>
<thead>
<tr>
<th>Bicycle Population</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.6%</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

Data Source: Workforce Population 2007-11 ACS PUMS 5-year Estimates
Factors Associated with the Bicycle Commute Use of Newcomers

Newcomer and Overall Bicycle Commute Share for Selected Cities, 2007-2011 ACS 5-Year Estimates

Data Source: Workforce Population 2007-11 ACS PUMS 5-year Estimates
Cities are fighting to attract bicyclists

“... I expect not only to take all of their [Portland and Seattle’s] bikers but I also want all the jobs that come with this.”

– Chicago Mayor Rahm Emanuel, 2012²

“Mayor Rahm Emanuel, when he announced bike routes in downtown Chicago, called out Seattle, saying he wanted our bikers and our tech jobs. We’re going to work to keep them here.”

– Seattle Mayor Mike McGinn, 2013³

² gridchicago.com December 14, 2012
³ seattlebikeblog.com February 20, 2013
Could we be in the midst of a “Legs Race”? 

Factors Associated with the Bicycle Commute Use of Newcomers
Research Goals

Why this study is important:

- Explores the relationship between bicycle use and inter-regional self-selection (i.e. newcomers)

- Provides a greater understanding of why and how some cities are attracting bicycle users

- Allows cities to gauge the types of individuals they are attracting when targeting bicycle users
Data and Methods

**Dataset**: American Community Survey (ACS) Public Use Microdata Sample (PUMS) 2007-2011 5-year estimates

**Sample**: Employed *newcomers* in 70 most populous US cities in 2012

**Independent Variables**: Individual level demographic factors and city-wide commuting levels

**Bicycle infrastructure**: Total miles of bicycle lanes and paths per square mile of land (Buehler & Pucher, 2012)

**Dependent Variable**: Bicycle commuter

---

Data Sample Definitions

**Bicycle commuter** - An individual who self-reported that they used a bicycle as their primary means of transportation to work
   - Bicycle commute use:
     “How did this person usually get to work LAST WEEK?” ⁵

**Newcomer** - An individual who moved to a new metropolitan region within the past year
   - Newcomer status:
     “Did this person live in this house or apartment 1 year ago?” ⁶

⁵ 2011 ACS
⁶ Ibid
Factors Associated with the Bicycle Commute Use of Newcomers

## Descriptive Results

### 70 Largest U.S. Cities, 2007-2011

<table>
<thead>
<tr>
<th>Socio-Demographics</th>
<th>ALL Newcomers</th>
<th>Newcomer Bicyclists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>723,004</td>
<td>14,231</td>
</tr>
<tr>
<td>Bicycle Commute Use</td>
<td>1.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Median Age</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td>Sex (Male)</td>
<td>51%</td>
<td>65%</td>
</tr>
<tr>
<td>Race (White, Non-Hispanic)</td>
<td>59%</td>
<td>78%</td>
</tr>
<tr>
<td>Relationship Status (Single/Never Married)</td>
<td>59%</td>
<td>75%</td>
</tr>
<tr>
<td>Educational Attainment (Bachelor's+)</td>
<td>37%</td>
<td>60%</td>
</tr>
<tr>
<td>Median Income</td>
<td>$14,000</td>
<td>$19,200</td>
</tr>
</tbody>
</table>

Source: 2007-2011 ACS PUMS 5-year Estimates
Descriptive Results

### 70 Largest U.S. Cities, 2007-2011

<table>
<thead>
<tr>
<th>Regional Variables</th>
<th>ALL Newcomers</th>
<th>Newcomer Bicyclists</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>12%</td>
<td>13%</td>
</tr>
<tr>
<td>East North Central</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>West North Central</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td>East South Central</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>West South Central</td>
<td>19%</td>
<td>10%</td>
</tr>
<tr>
<td>Mountain</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>Pacific</td>
<td>24%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Source: 2007-2011 ACS PUMS 5-year Estimates
Where Newcomers Move: Bicycle Infrastructure

Source: 2007-2011 ACS PUMS 5-year Estimates

Factors Associated with the Bicycle Commute Use of Newcomers
Where Newcomers Move: Pre-Existing Bicycle Use

Source: 2007-2011 ACS PUMS 5-year Estimates
## Bivariate Logistic Regression - Newcomers: Likelihood of Using a Bicycle for Commuting

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Block 1</th>
<th></th>
<th>Block 2</th>
<th></th>
<th>Block 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Odds ratio</td>
<td>Coefficient</td>
<td>Odds ratio</td>
<td>Coefficient</td>
<td>Odds ratio</td>
</tr>
<tr>
<td>Constant</td>
<td>-6.28</td>
<td></td>
<td>-6.93</td>
<td></td>
<td>-7.77</td>
<td></td>
</tr>
<tr>
<td>Individual Factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.67 ***</td>
<td>1.96</td>
<td>0.70 ***</td>
<td>2.01</td>
<td>0.70 ***</td>
<td>2.02</td>
</tr>
<tr>
<td>White</td>
<td>0.77 ***</td>
<td>2.16</td>
<td>0.68 ***</td>
<td>1.98</td>
<td>0.69 ***</td>
<td>2.00</td>
</tr>
<tr>
<td>Single/Never Married</td>
<td>0.37 ***</td>
<td>1.45</td>
<td>0.27 ***</td>
<td>1.31</td>
<td>0.30 ***</td>
<td>1.35</td>
</tr>
<tr>
<td>Bachelors Degree or Higher</td>
<td>0.54 ***</td>
<td>1.72</td>
<td>0.46 ***</td>
<td>1.58</td>
<td>0.50 ***</td>
<td>1.64</td>
</tr>
<tr>
<td>Physical Environment Factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle Infrastructure</td>
<td>0.43 ***</td>
<td>1.54</td>
<td>0.08 ***</td>
<td>1.09</td>
<td>0.36 ***</td>
<td>1.35</td>
</tr>
<tr>
<td>Social Environment Factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-existing Bicycle Use</td>
<td>0.69 ***</td>
<td>1.99</td>
<td>1.11 ***</td>
<td>2.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical/Social Interaction Factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction (Infrastructure &amp; Pre-existing Bicycle Use)</td>
<td>-0.14 ***</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2 Log Likelihood^</td>
<td>159776.24</td>
<td></td>
<td>154076.64</td>
<td></td>
<td>152645.24</td>
<td></td>
</tr>
<tr>
<td>McFadden's R2</td>
<td>0.062</td>
<td></td>
<td>0.096</td>
<td></td>
<td>0.104</td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>956,601</td>
<td></td>
<td>956,601</td>
<td></td>
<td>956,601</td>
<td></td>
</tr>
</tbody>
</table>

^ Initial - 2 Log Likelihood: 170393.052

***p <0.01, **p <0.05

Dann, 2014
Newcomers have much greater odds of being bicycle commuters if they are... Male and White. It doesn’t hurt if they are single or college educated.

Photo Credit: Mark Kenseth
Bicycle infrastructure appeared to only play a role in predicting newcomer bicycle use when pre-existing levels of bicycle use were very low.

The greatest overall determinant of newcomer bicycle use was...

pre-existing levels of bicycle use.
Conclusion and Discussion

Bicyclists like being near other bicyclists.
  – Safety in numbers
  – Bicycle culture
  – Other lifestyle amenities

Bicycle infrastructure has a limited ability to attract new bicyclists.
  – Infrastructure usually lags behind demand
  – Not all bicycle infrastructure is created equal
  – U.S. bicycle infrastructure is not state-of-the-art
Limitations

- Work trips only make up 22% of all household trips\(^7\).
- When does a newcomer become a long-time resident?
- Are cities ‘magnets’ or ‘catalysts’ for bicycle use?

\(^7\) 2009 National Household Travel Survey
While commute trips represent only 22% of all bicycle trips, the commute trip is still king:

- Congestion
- Peak travel period
- Most bicycle crashes or injuries
- Measures social equity
ACS: Limitations

- Sample reliability and margins of error
  - Can only ‘slice and dice’ the data in so many ways
  - We miss out entirely on smaller populations
- Data from 5-year estimates aren’t ‘fresh’
  - Bicycle use can dramatically change in 5 years
- PUMS data masks variations within a city
  - Bicycle use and migration patterns aren’t evenly distributed within cities
ACS: Looking Forward

- 2010-2014 ACS 5-Year Estimates
  - Trend analysis
- Larger populations of bicycle users
  - Increases in sample reliability
- New PUMA boundaries
  - 2012 ACS data uses 2010 Census PUMAs
- Regional differences
  - Does it matter where you came from or where you go?
Factors Associated with the Bicycle Commute Use of Newcomers