Sustainability and Displacement: Assessing the Spatial Pattern of Residential Moves near Rail Transit

Marlon G. Boarnet, Ph.D.
Raphael W. Bostic, Ph.D.
Seva Rodnyansky
Raúl Santiago-Bartolomei
Danielle Williams
Allen Prohofsky
Policy Issue

• Rail transit and neighborhood impacts are linked in the public mind
  • Gentrifying neighborhoods are disproportionately near rail transit in San Francisco Bay (Chapple, 2009)

• The concern about gentrification has been refocused on displacement
  • Are long-term, lower-income residents forced out of rail-proximate neighborhoods?
Previous research

• Works on displacement utilize either cross-sectional, simulation, longitudinal housing unit, or aggregated approaches
  • Cross-sectional approaches used to identify a relationship between transit-oriented development (TOD) and affordable housing (Cervero, 2008; Pollack et al., 2010)
  • Land use simulations used to forecast impact of rail transit on gentrification (Dawkins and Moeckel, 2014)
  • Aggregated and longitudinal analyses used to assess relationship between displacement and gentrification (Ellen & O’Regan, 2010; Freeman, 2005; Vigdor et al., 2002)
Research Objective

- Using geocoded California income tax information for LA County, we will:
  - Track individual households by income;
  - Analyze household mobility before and after rail investment occurs (station opening);
  - Develop a like for like counterfactual from the same dataset; and
  - Analyze displacement trends at frequencies as often as annual over several years.
Methods

• DID approach
  • Monitor movement of tax filers before and after a rail station opening

• Select treatment variables
  • Halfmile buffer zones from sample of 10 LA Metro transit rail stations
  • Dates when individual transit stations opened as focal points

• Select control areas as counterfactual
  • Halfmile buffer zones of comparable areas outside rail influence (Schuetz, Giuliano, & Shin, 2016)
Data Construction

- Panel of ~140 million filing records over 21 years: anyone who has ever filed taxes in Los Angeles County in any year between 1993-2013

- Aggregated by station area / control area using 2 layer geocoding: distance to zip9 centroid and to zip5 centroid
  - Zip9 is <= 1 street block; accounts for the majority of the geocoding
  - Zip5 is a much larger geography, but is more fully covered in the dataset

- Stayers are filers who file taxes in the same station / control area in a set of 2 consecutive years (e.g., 1993 and 1994)
  - Out-movers: filed in station area in 1993, but not in 1994
  - In-movers: filed in station area in 1994, but not in 1993
Control areas

Set buffer zone 1-3 mi from all rail stations

- SCAG roads shapefile

Select intersections with equal number of lanes as rail stations

- Proxy for built environment

Contrast sociodemographics

- Tax data
## Treatment and Control Areas

<table>
<thead>
<tr>
<th>Rail station</th>
<th>Paired control area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Del Mar</td>
<td>Mountain-Allen</td>
</tr>
<tr>
<td>Hollywood/Highland</td>
<td>Fairfax-Santa Monica</td>
</tr>
<tr>
<td>Highland Park</td>
<td>York-Yosemite</td>
</tr>
<tr>
<td>Hollywood/Western</td>
<td>Western-Melrose</td>
</tr>
<tr>
<td>La Brea</td>
<td>Jefferson-Western</td>
</tr>
<tr>
<td>Mariachi Plaza</td>
<td>Gaga-Chavez</td>
</tr>
<tr>
<td>Soto</td>
<td>Terrace-Hazard</td>
</tr>
<tr>
<td>Universal City</td>
<td>Ventura-Laurel Canyon</td>
</tr>
<tr>
<td>Vermont/Sunset</td>
<td>Beverly-Alvarado</td>
</tr>
<tr>
<td>Wilshire/Western</td>
<td>La Brea-Wilshire</td>
</tr>
</tbody>
</table>
Treatment and Control Areas
Area comparison

Total number of filers for rail: 443,439
Total number of filers for control areas: 314,802
Area comparison

Median income trend

Trend in percent of stayers
Model Set-Up

\[ Y_{it} = \alpha + \delta \text{Treatment}_{it} + \sum_{t-3}^{t+3} \beta_j \text{Treatment}_{it} + \sum_{n=1}^{n=21} \lambda_j Year_n + \sum_{z=1}^{z=20} \gamma_j Station_z \]

Where:
\( Y = \) percent of stayers
\( Treatment = \) Interactive dummy for rail station open (1 = rail station open, 0 = control area or rail station close)
\( Year = \) Fixed effects dummy year variable
\( Station = \) Fixed effects dummy station variable
Regression results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>const</td>
<td>0.59544</td>
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<tr>
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<td>0.010183</td>
<td>0.0133 **</td>
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<td>0.006904</td>
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<td>0.0044 ***</td>
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<tr>
<td>treatment_plus3</td>
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<tr>
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<tr>
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<tr>
<td>sa_CA11</td>
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<td>0.010997</td>
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</tr>
</tbody>
</table>

R-squared 0.879854
Adjusted R-squared 0.864198
F(46, 353) 69.86735
P-value(F) 4.90E-150
Concluding remarks and next steps

• The presence and opening of rail transit stations can have a negative and significant effect over the rate of “staying” households in neighborhoods
  • TOD could increase displacement
  • Baseline household movement is larger than expected

• Next steps:
  • Develop more systematic approach to select control areas (e.g. propensity score matching)
  • Analyze displacement trends in further detail
Questions? Comments?

Marlon G. Boarnet, Ph.D.
University of Southern California
Sol Price School of Public Policy
Department of Urban Planning and Spatial Analysis
Email: boarnet@usc.edu

Raúl Santiago-Bartolomei
University of Southern California
Sol Price School of Public Policy
Department of Urban Planning and Spatial Analysis
Email: raulsant@usc.edu