

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

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STATE OF CALIFORNIA  
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# 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)

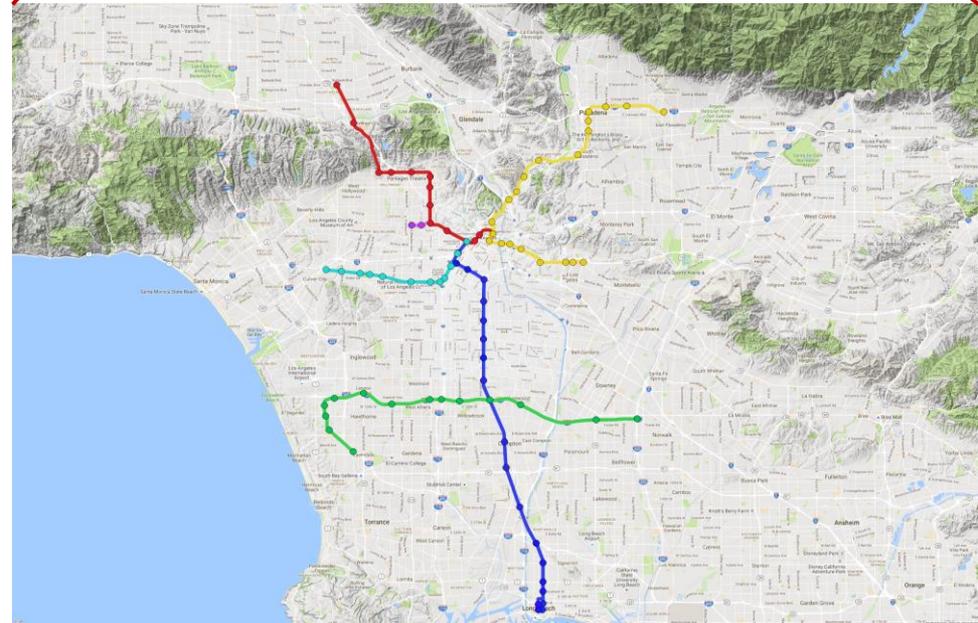
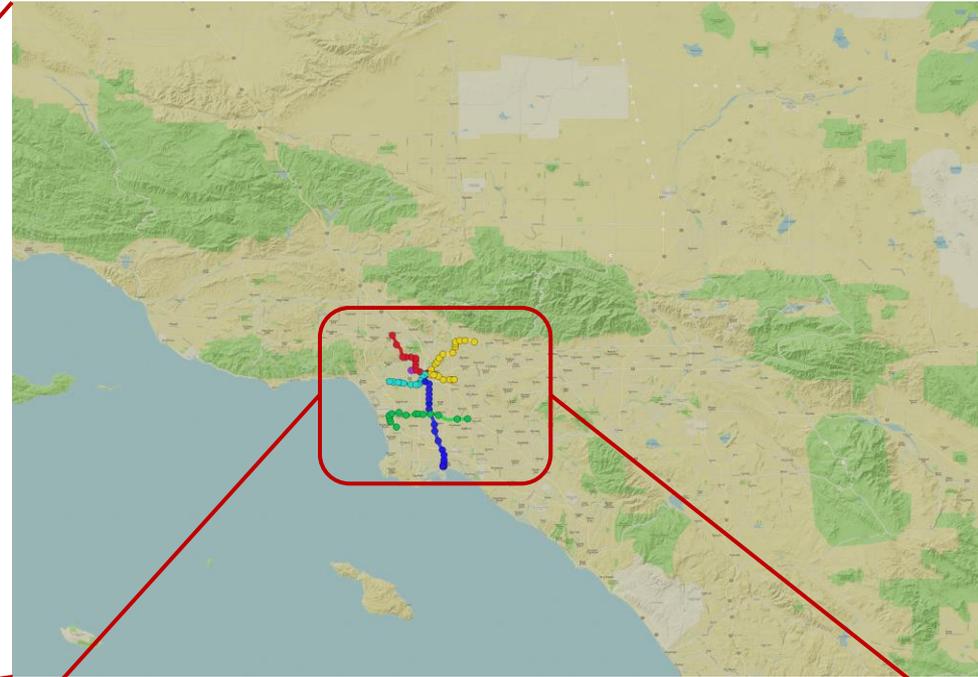
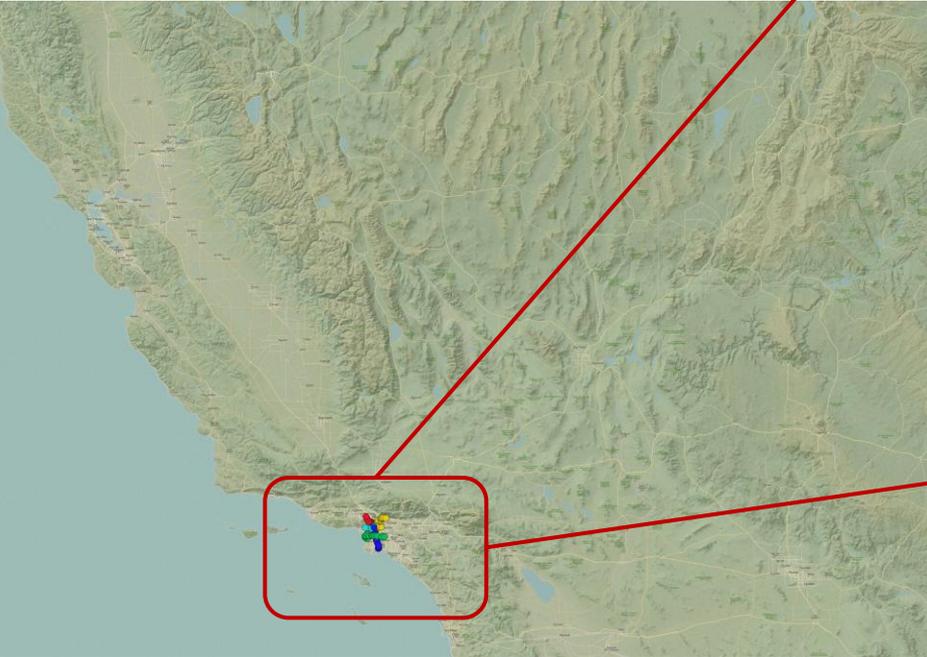


# Research Objective

- 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.



# Study Area



# 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)

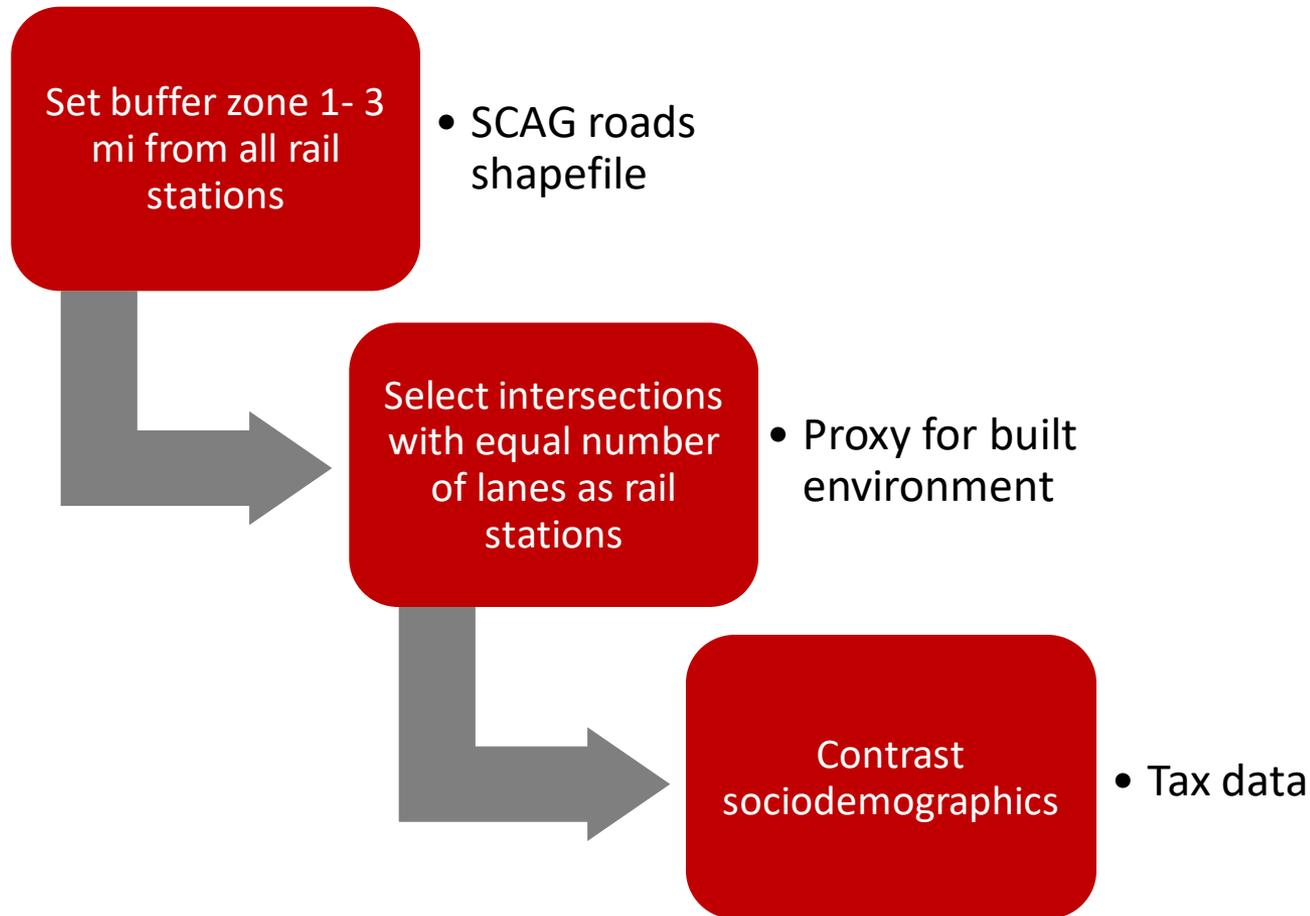


# Data Construction

- 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  $\leq 1$  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

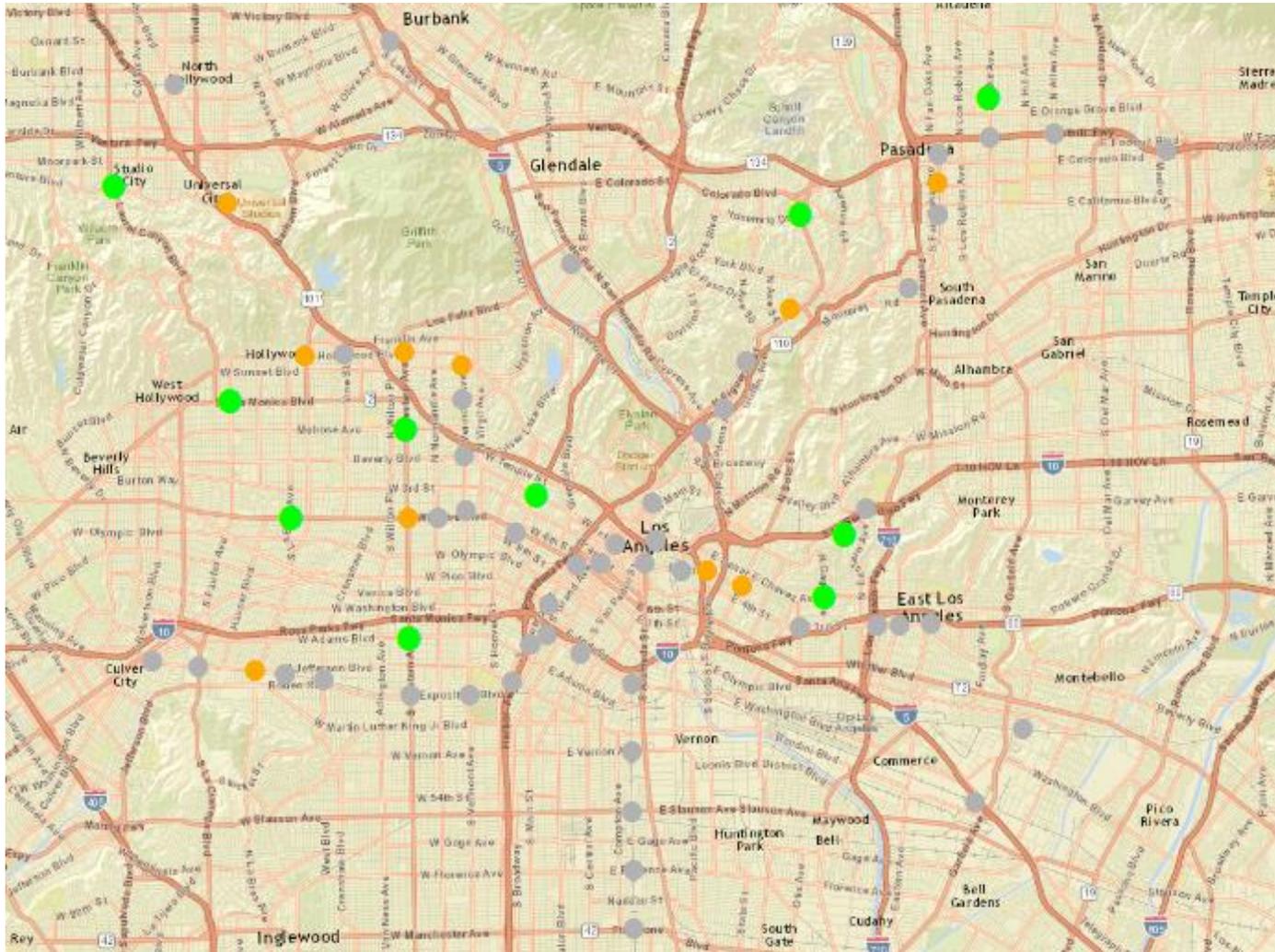


# Treatment and Control Areas

<b>Rail station</b>	<b>Paired control area</b>
Del Mar	Mountain-Allen
Hollywood/Highland	Fairfax-Santa Monica
Highland Park	York-Yosemite
Hollywood/Western	Western-Melrose
La Brea	Jefferson-Western
Mariachi Plaza	Gaga-Chavez
Soto	Terrace-Hazard
Universal City	Ventura-Laurel Canyon
Vermont/Sunset	Beverly-Alvarado
Wilshire/Western	La Brea-Wilshire

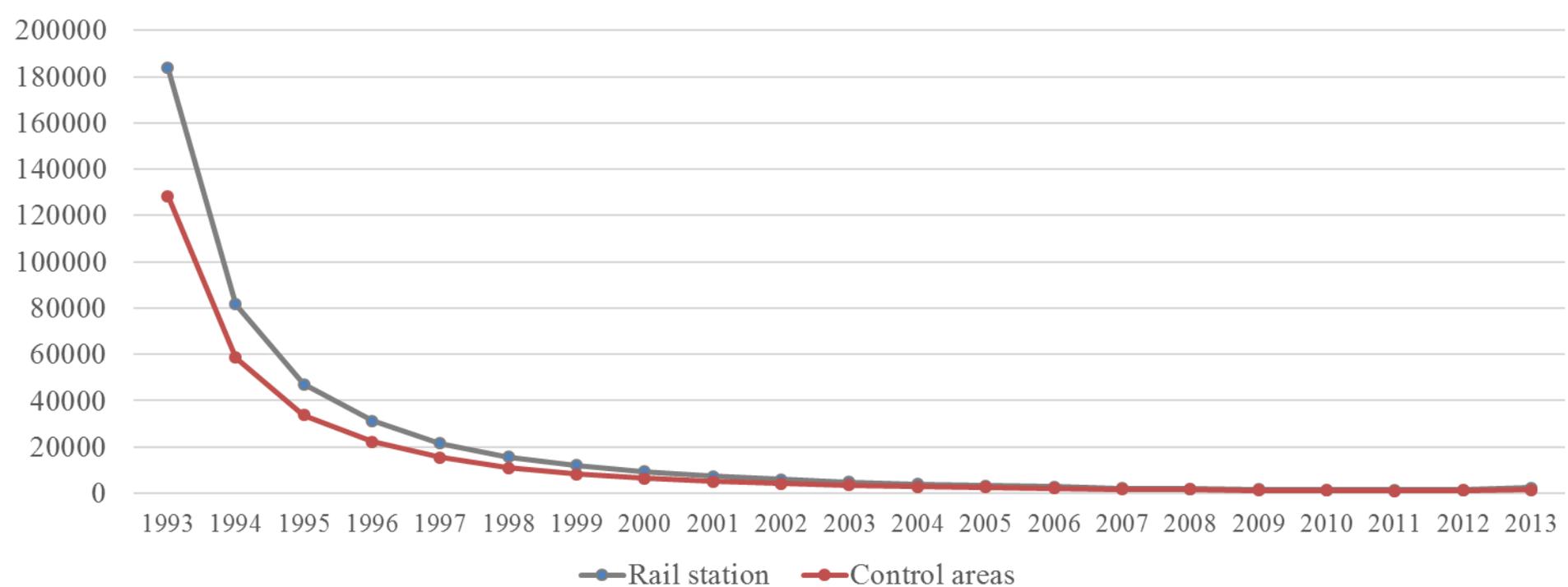


# Treatment and Control Areas



# Area comparison

Cummulative distribution



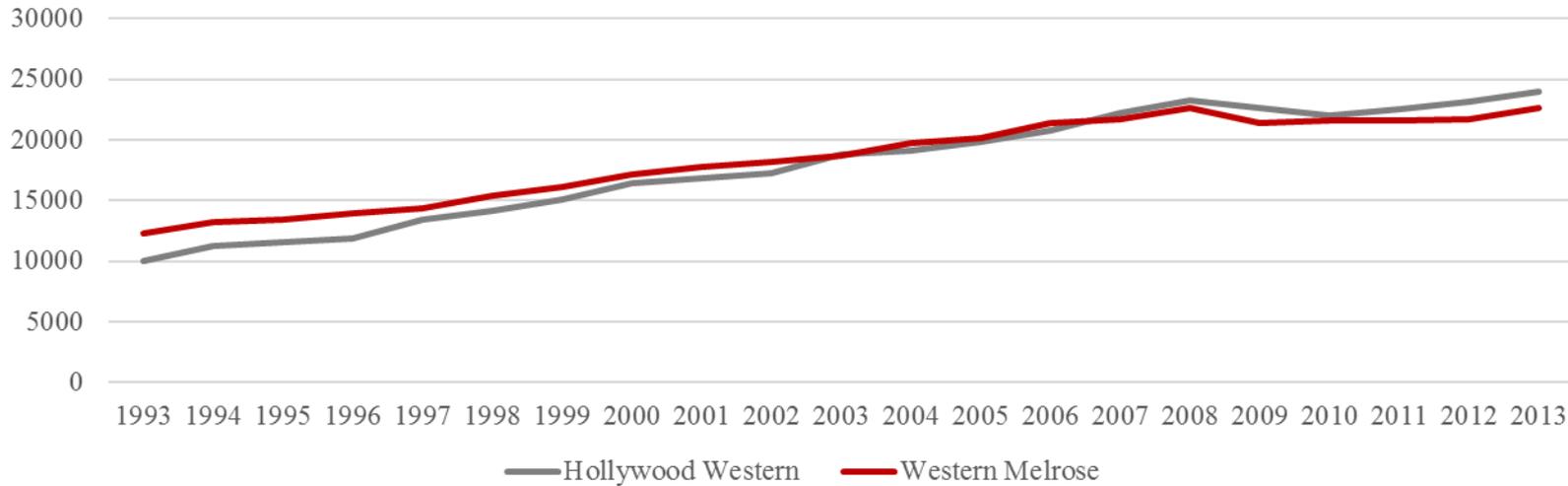
Total number of filers for rail: 443,439

Total number of filers for control areas: 314,802

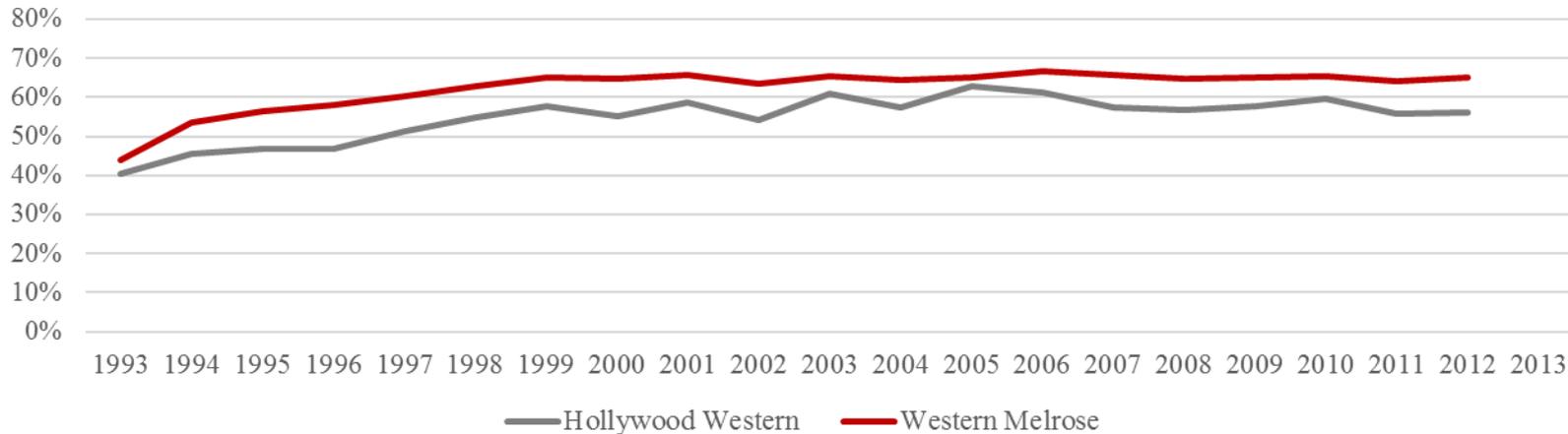


# Area comparison

Median income trend



Trend in percent of stayers



# Model Set-Up

$$Y_{it} = \alpha + \delta Treatment_{it} + \sum_{t-3}^{t+3} \beta_j Treatment_{it} + \sum_{n=1}^{n=21} \lambda_j Year_n + \sum_{z=1}^{z=20} \gamma_j Station_z$$

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

<b>Model 1: OLS, using observations 1-420 (n = 400)</b>			
<b>Heteroskedasticity-robust standard errors, variant HC1</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>p-value</b>
const	0.59544	0.01186	8.5E-163 ***
treatment	-0.025330	0.010183	0.0133 **
treatment_plus0	0.011935	0.006904	0.0847 *
treatment_plus1	0.005629	0.006575	0.3925
treatment_plus2	0.019782	0.006899	0.0044 ***
treatment_plus3	0.007106	0.008652	0.412
treatment_minus1	-0.015187	0.010015	0.1303
treatment_minus2	-0.009135	0.008042	0.2568
treatment_minus3	-0.006224	0.008754	0.4775
y1993	-0.169698	0.020765	5.48E-15 ***
:			
:			
y2011	0.00317565	0.008102	0.6953
sa_DM	-0.0223848	0.014056	0.1122
:			
:			
sa_CA11	0.112665	0.010997	9.77E-22 ***
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?

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