

STREETCARS, JOBS, PEOPLE AND GENTRIFICATION: CASE STUDIES OF FOUR STREETCAR SYSTEMS

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RESEARCH DESIGN

Pre-post, quasi-experimental design with spatial controls

Before and After years for four streetcar systems

Streetcar Line	Before Year	After Year
Portland, Central Loop	2006	2013
Seattle, South Lake Union	2000	2013
New Orleans, Rampart-St. Claude	2008	2013
Salt Lake City, S Line	2009	2013

Note: "Before" is defined as 3 years prior to the start of construction while "After" is defined as one year after the streetcar began service, or the most recent available data. Ranges of years may differ based on data availability as described in the text.

RESEARCH TOPICS

- The extent to which streetcars attract jobs to their station areas based on wage categories;
- Whether the demographic composition of people living within streetcar station areas change after streetcars are introduced;
- Whether demographic changes can be characterized as gentrification;
- The extent to which gentrification leads to job displacement by wage level; and
- The extent to which demographic changes and changes in jobs by wage level are significantly different than expected for the metropolitan area as a whole and for control "control" station areas based on bus stops of roughly comparable economic and demographic characteristics as streetcar station areas.

DATA

Longitudinal Employer Household Dynamics (LEHD)

METHOD

Shift-share analysis

$$SS_i = CC_i + SM_i + \text{Station Area}$$

SS_i = Shift-Share

CC_i = Central County share

SM_i = Sector Mix

Station Area_i = Transit Station Area shift

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Results for Portland



Figure 1 Portland streetcar on Tilikum Crossing Bridge over the Willamette River
Source: https://upload.wikimedia.org/wikipedia/commons/2/22/Portland_Streetcar_on_Tilikum_Crossing_bridge_Sep_2015.jpg

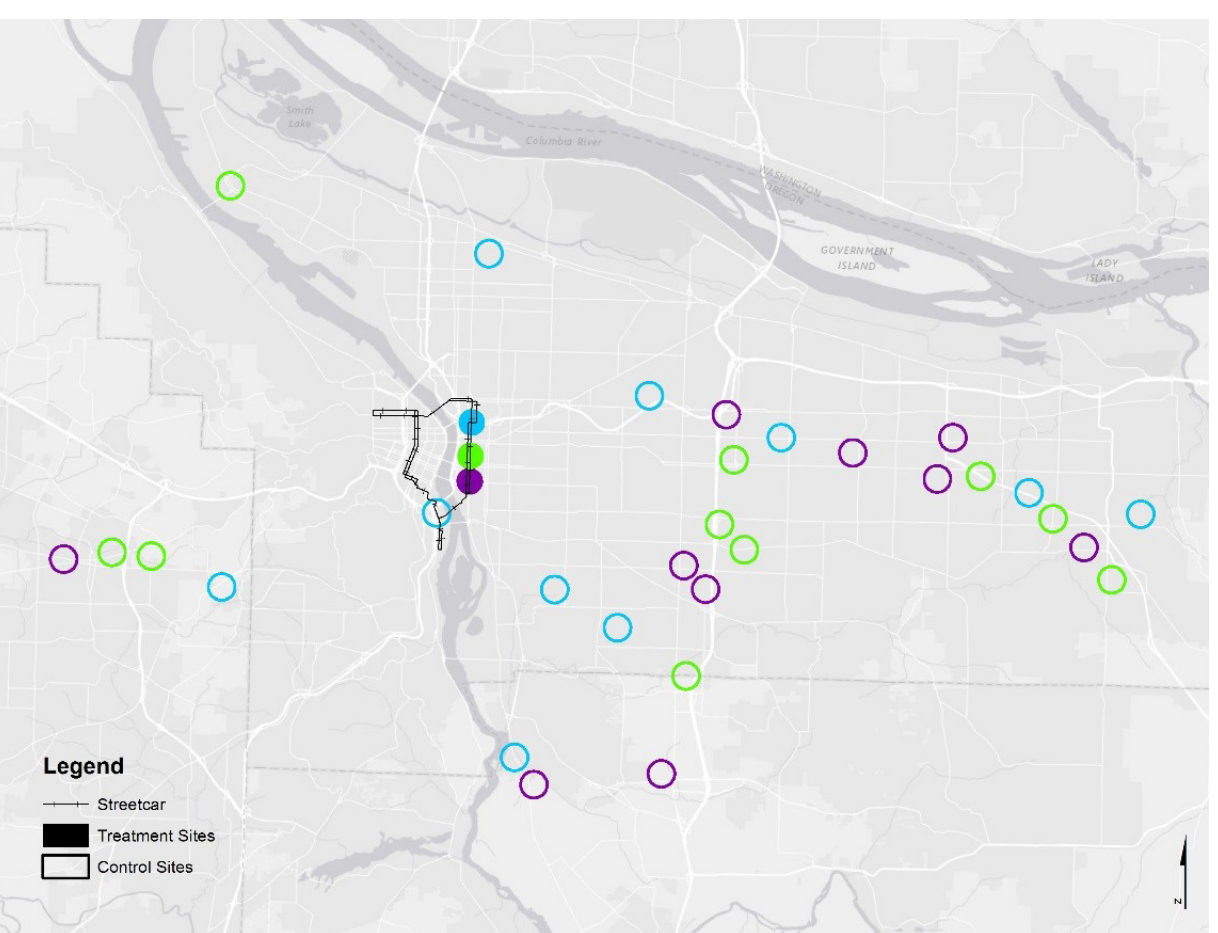


Figure 2 Portland, OR quarter-mile streetcar stations areas (solid circles) and matched control station areas (outlined circles).
Source: Hinners and Larice (2016)

Table 1 Descriptive and Shift-Share Results for Portland Streetcar Change in Jobs by Wage Category

Wage Category	Control Station Area 2006	Control Station Area 2013	Metro Area 2006	Metro Area 2013	Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
Lower Wage	4,099	4,124	320,281	338,343	1%	6%	*	-206
Middle Wage	5,874	6,724	483,832	517,502	14%	7%	*	441
Upper Wage	2,445	2,418	403,151	425,412	-1%	6%	*	-162
Total	12,418	13,256	1,207,264	1,281,257	7%	6%	*	73
Wage Category	Streetcar Station Area 2006	Streetcar Station Area 2013	Metro Area 2006	Metro Area 2013	Station Area Change	Metro Area Change	z	Streetcar Station Area Shift-Share
Lower Wage	2,639	3,099	320,281	338,343	17%	6%	*	311
Middle Wage	4,116	4,530	483,832	517,502	10%	7%	*	128
Upper Wage	5,976	7,966	403,151	425,412	33%	6%	*	1,660
Total	12,731	15,595	1,207,264	1,281,257	22%	6%	*	2,099

*Z scores are p < 0.05.

Table 2 Descriptive and Shift-Share Results for Portland Streetcar Change in Total Population and Race

Race	Control Station Area 2005-2009	Control Station Area 2009-2013	Metro Area 2005-2009	Metro Area 2009-2013	Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
White	21,479	24,399	1,808,019	1,857,416	14%	3%	*	2,333
Black	1,226	1,856	58,959	64,958	51%	10%	*	505
Asian	1,884	2,681	113,828	132,990	42%	17%	*	480
Other	3,929	4,251	182,630	205,227	8%	12%	*	-164
Total	28,518	33,187	2,163,436	2,260,591	16%	4%	*	3,154

Race	Streetcar Station Area 2005-2009	Streetcar Station Area 2009-2013	Metro Area 2005-2009	Metro Area 2009-2013	Station Area Change	Metro Area Change	z	Streetcar Station Area Shift-Share
White	4,809	4,285	1,808,019	1,857,416	-11%	3%	*	-675
Black	406	402	58,959	64,958	-1%	10%	*	-45
Asian	176	172	113,828	132,990	-2%	17%	*	-34
Other	407	373	182,630	205,227	-8%	12%	*	-84
Total	5,768	5,212	2,163,436	2,260,591	-10%	4%	*	-839

*Z scores are p < 0.05.

Table 3 Change in Gentrification Markers for Portland Streetcar: Income and Home Value

Marker	Control Station Area 2005-2009	Control Station Area 2009-2013	Metro Area 2005-2009	Metro Area 2009-2013	Station Area Change	Metro Area Change	z
HH Income	28,633	30,385	63,896	61,016	6.10%	-4.50%	*
Home Value	269,359	238,140	378,026	328,871	-11.60%	-13.00%	*
Marker	Streetcar Station Area 2005-2009	Streetcar Station Area 2009-2013	Metro Area 2005-2009	Metro Area 2009-2013	Station Area Change	Metro Area Change	z
HH Income	55,938	58,660	63,896	61,016	5%	-5%	*
Home Value	468,636	416,501	378,026	328,871	-11%	-13%	*

*Z scores are p < 0.05.

"HH Income" means median household income and "Home Value" means median home value of owner-occupied homes.

Note: Values in 2015 dollars based on middle year of ACS range (2007 and 2011, respectively).

Findings

- Compared to the central county and controls, the Portland streetcar stations experienced greater share in the shift of jobs across all wage categories during the study period.
- However, the streetcar station areas experienced loss in the shift of share of population, almost as though people were being displaced by jobs within one-half mile of streetcar stations. This is also reflected in observing little or no apparent gentrification effects, indicated by no substantial differences in housing price change between the control and streetcar station areas over the study period.

Results for Seattle



Figure 3 Seattle streetcar in downtown
Source: https://upload.wikimedia.org/wikipedia/commons/5/58/South_Lake_Union_Streetcar_approaches_Stewart_Street.jpg

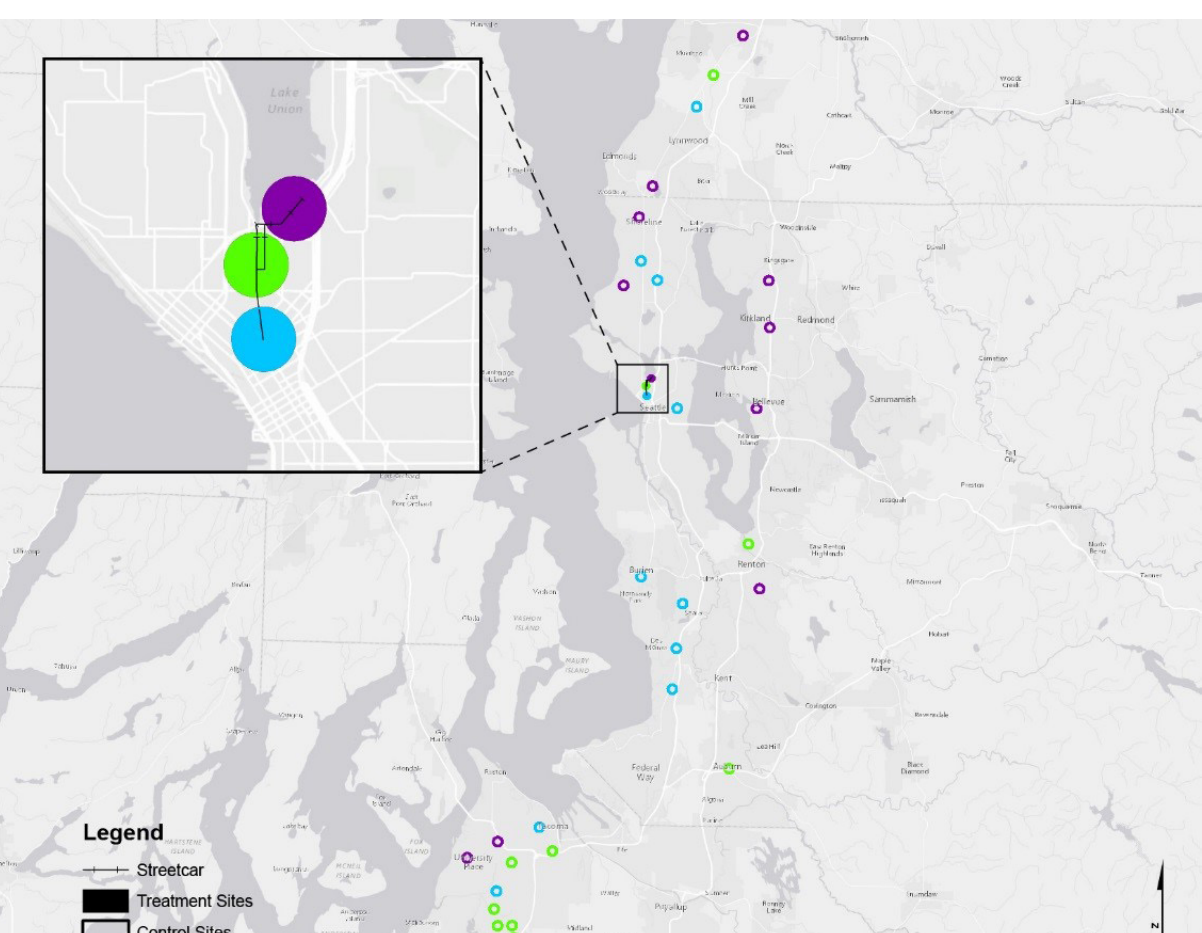


Figure 4 Seattle, WA quarter-mile streetcar stations areas (solid circles) and matched control station areas (outlined circles).
Source: Hinners and Larice (2016)

Table 4 Descriptive and Shift-Share Results for Seattle Streetcar Change in Jobs by Wage Category

Wage Category	Control Station Area 2003	Control Station Area 2013	Metro Area 2003	Metro Area 2013	Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
Lower Wage	11,711	33,216	490,221	547,411	184%	12%	*	20,139
Middle Wage	33,474	34,555	468,115	593,394	3%	27%	*	-7,877
Upper Wage	23,448	38,010	613,897	720,092	62%	17%	*	10,506
Total	68,633	105,781	1,572,233	1,860,897	54%	18%	*	22,767

Wage Category	Streetcar Station Area 2003	Streetcar Station Area 2013	Metro Area 2003	Metro Area 2013	Station Area Change	Metro Area Change	z	Streetcar Station Area Shift-Share
Lower Wage	17,408	14,206	490,221	547,411	-18%	12%	*	-5,233
e Wage	14,148	15,653	468,115	593,394	11%	27%	*	-2,281
Upper Wage	28,597	29,822	613,897	720,092	4%	17%	*	-3,722
Total	60,153	59,681	1,572,233	1,860,897	-1%	18%	*	-11,236

*Z scores are p < 0.05.

Table 5 Descriptive and Shift-Share Results for Seattle Streetcar Change in Total Population and Race

Race	Control Station Area 2000	Control Station Area 2010	Metro Area 2000	Metro Area 2010	Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
White	19,126	18,910	2,819,296	2,474,896	-1%	-12%	*	2,120
Black	4,193	4,647	165,938	191,967	11%	16%	*	-204
Asian	2,968	3,433	280,696	392,961	16%	40%	*	-722
Other	2,515	6,200	140,920	379,985	147%	170%	*	-582
Total	28,802	33,190	3,406,850	3,439,809	15%	1%	*	613

Race	Streetcar Station Area 2000	Streetcar Station Area 2010	Metro Area 2000	Metro Area 2010	Station Area Change	Metro Area Change	z	Streetcar Station Area Shift-Share
White	5,478	8,497	1,808,019	1,857,416	55%	3%	*	2,869
Black	862	1,158	58,959	64,958	34%	10%	*	208
Asian	491	1,331	113,828	132,990	171%	17%	*	757
Other	401	986	182,630	205,227	146%	12%	*	535
Total	7,232	11,972	2,163,436	2,260,591	66%	4%	*	4,370

*Z scores are p < 0.05.

Table 6 Change in Gentrification Markers for Seattle Streetcar: Income and Home Value

Marker	Control Station Area 2000	Control Station Area 2010	Metro Area 2000	Metro Area 2010	Station Area Change	Metro Area Change	z
HH Income	\$32,489	\$46,530	\$70,012	\$71,286	43.20%	1.80%	*
Home Value	\$290,319	\$360,782	\$335,494	\$457,303	24.30%	36.30%	*
Marker	Streetcar Station Area 2000	Streetcar Station Area 2010	Metro Area 2000	Metro Area 2010	Station Area Change	Metro Area Change	z
HH Income	\$53,529	\$70,844	\$70,012	\$71,286	32.30%	1.80%	*
Home Value	\$643,401	\$663,543	\$335,494	\$457,303	3.10%	36.30%	*

*Z scores are p < 0.05.

"HH Income" means median household income and "Home Value" means median home value of owner-occupied homes.

Note: Values in 2015 dollars based on middle year of ACS range (2000 and 2010, respectively).

Findings

- Compared to the central county and controls, the Seattle streetcar stations lost share in the shift of jobs lower and upper wage categories over the study period.
- In contrast, the streetcar stations gained share in the shift of population during the study period, almost as if people were displacing jobs.
- Perplexing however is the very modest increase in housing prices within streetcar station areas compared to the rest of the metropolitan area suggesting perhaps that the market premium for streetcar accessibility has matured. Perhaps the station area submarket has become fully gentrified.

Results for Salt Lake City



Figure 5 Salt Lake City streetcar at South Salt Lake park and ride station
Source: https://upload.wikimedia.org/wikipedia/commons/d/d4/WB_S_Line_at_South_Salt_Lake_City_station_Jan_16.jpg

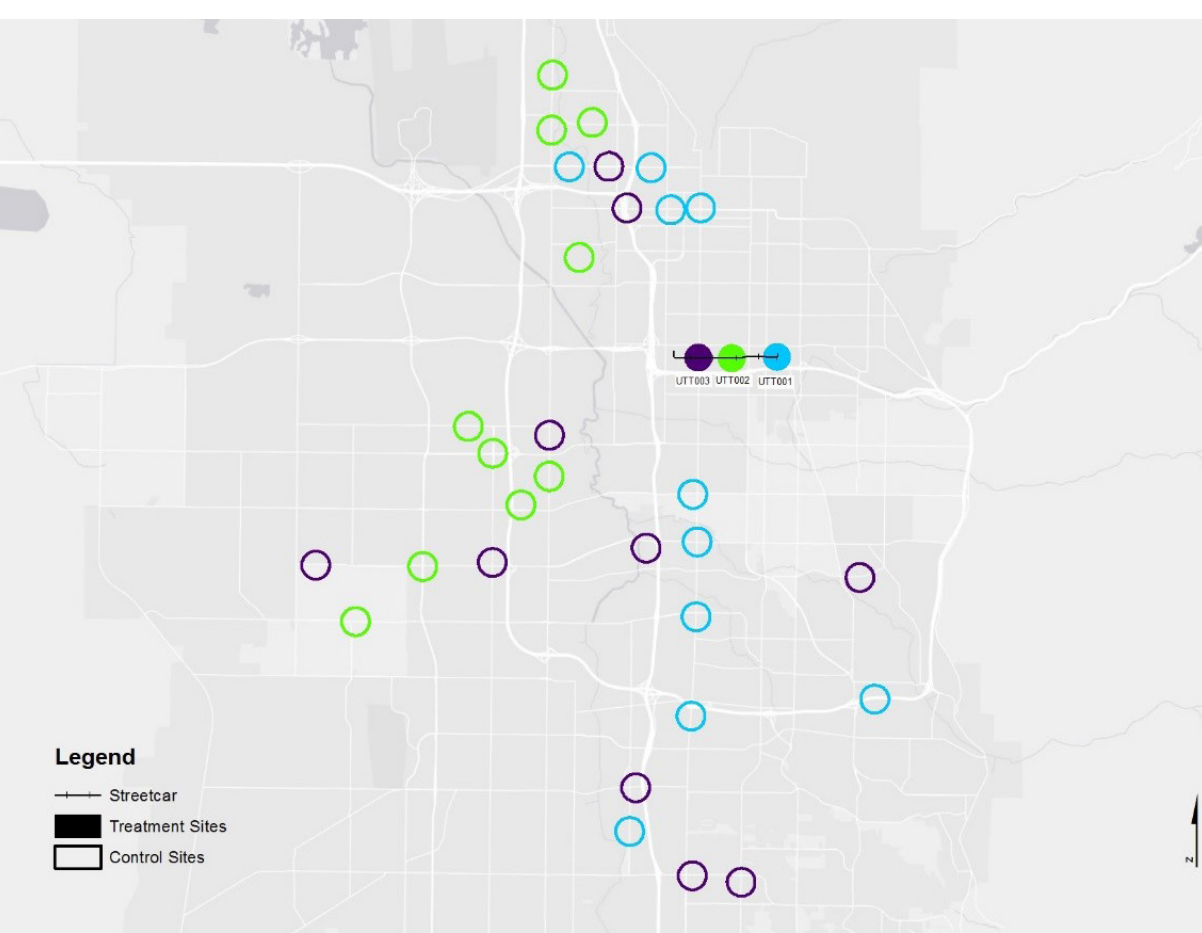


Figure 6 Salt Lake City, UT quarter-mile streetcar stations areas (solid circles) and matched control station areas (outlined circles).
Source: Hinners and Larice (2016)

Table 7 Descriptive and Shift-Share Results for Salt Lake City Streetcar Change in Jobs by Wage Category

Wage Category	Control Station Area 2009	Control Station Area 2013	Metro Area 2009	Metro Area 2013	Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
Lower Wage	560	1,606	171,656	182,959	187%	7%	*	1,009
Middle Wage	1,006	1,359	290,439	317,453	35%	9%	*	259
Upper Wage	344	524	240,517	256,778	52%	7%	*	157
Total	1,910	3,489	702,612	757,190	83%	8%	*	1,425

Wage Category	Streetcar Station Area 2009	Streetcar Station Area 2013	Metro Area 2009	Metro Area 2013	Station Area Change	Metro Area Change	z	Streetcar Station Area Shift-Share
Lower Wage	1,676	1,675	171,656	182,959	0%	7%	*	-111
Middle Wage	916	962	290,439	317,453	5%	9%	*	-39
Upper Wage	1,497	1,384	240,517	256,778	-8%	7%	*	-214
Total	4,089	4,021	702,612	757,190	-2%	8%	*	-365

*Z scores are p < 0.05.

Table 8 Descriptive and Shift-Share Results for Salt Lake City Streetcar Change in Total Population and Race

Race	Control Station Area 2007-2011	Control Station Area 2010-2014	Metro Area 2007-2011	Metro Area 2010-2014	Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
White	23,124	21,203	968,161	942,595	-8%	-3%	*	-1,310
Black	734	900	16,458	17,983	23%	9%	*	98
Asian	1,040	1,123	34,256	38,110	8%	11%	*	-34
Other	4,798	8,071	90,505	124,955	68%	38%	*	1,447
Total	29,696	31,207	1,109,380	1,123,643	5%	1%	*	200

Race	Streetcar Station Area 2007-2011	Streetcar Station Area 2010-2014	Metro Area 2007-2011	Metro Area 2010-2014	Station Area Change	Metro Area Change	z	Streetcar Station Area Shift-Share
White	5,568	6,073	968,161	942,595	9%	-3%	*	652
Black	162	111	16,458	17,983	-31%	9%	*	-66
Asian	735	1,017	34,256	38,110	38%	11%	*	199
Other	588	534	90,505	124,955	-9%	38%	*	-278
Total	7,053	7,735	1,109,380	1,123,643	10%	1%	*	508

*Z scores are p < 0.05.

Table 9 Change in Gentrification Markers for Salt Lake City Streetcar: Income and Home Value

Marker	Control Station Area 2007-2011	Control Station Area 2010-2014	Metro Area 2007-2011	Metro Area 2010-2014	Station Area Change	Metro Area Change	z
HH Income	\$33,304	\$30,067	\$65,923	\$63,375	-9.70%	-3.90%	*
Home Value	\$206,364	\$185,066	\$323,753	\$277,740	-10.30%	-14.20%	*
Marker	Streetcar Station Area 2007-2011	Streetcar Station Area 2010-2014	Metro Area 2007-2011	Metro Area 2010-2014	Station Area Change	Metro Area Change	z
HH Income	\$54,895	\$63,507	\$65,923	\$63,375	-2.50%	-3.90%	*
Home Value	\$259,641	\$235,417	\$323,753	\$277,740	-9.30%	-14.20%	*

*Z scores are p < 0.05.

"HH Income" means median household income and "Home Value" means median home value of owner-occupied homes.

Note: Values in 2015 dollars based on middle year of ACS range (2009 and 2012, respectively).

Findings

- Compared to the central county and controls, the Sugar Housed streetcar stations lost share in the shift of jobs lower and upper wage categories over the study period.
- In contrast, the streetcar stations gained share in the shift of population during the study period, almost as if people were displacing jobs.
- Moreover, housing prices within streetcar station areas rose substantially compared to the controls suggesting gentrification may be occurring.

Results for New Orleans



Figure 7 New Orleans Rampart-St. Claude streetcar
Source: https://upload.wikimedia.org/wikipedia/commons/d/d4/St_Claude_Rampart_Streetcar_8_Oct_2016_New_Orleans_02.jpg

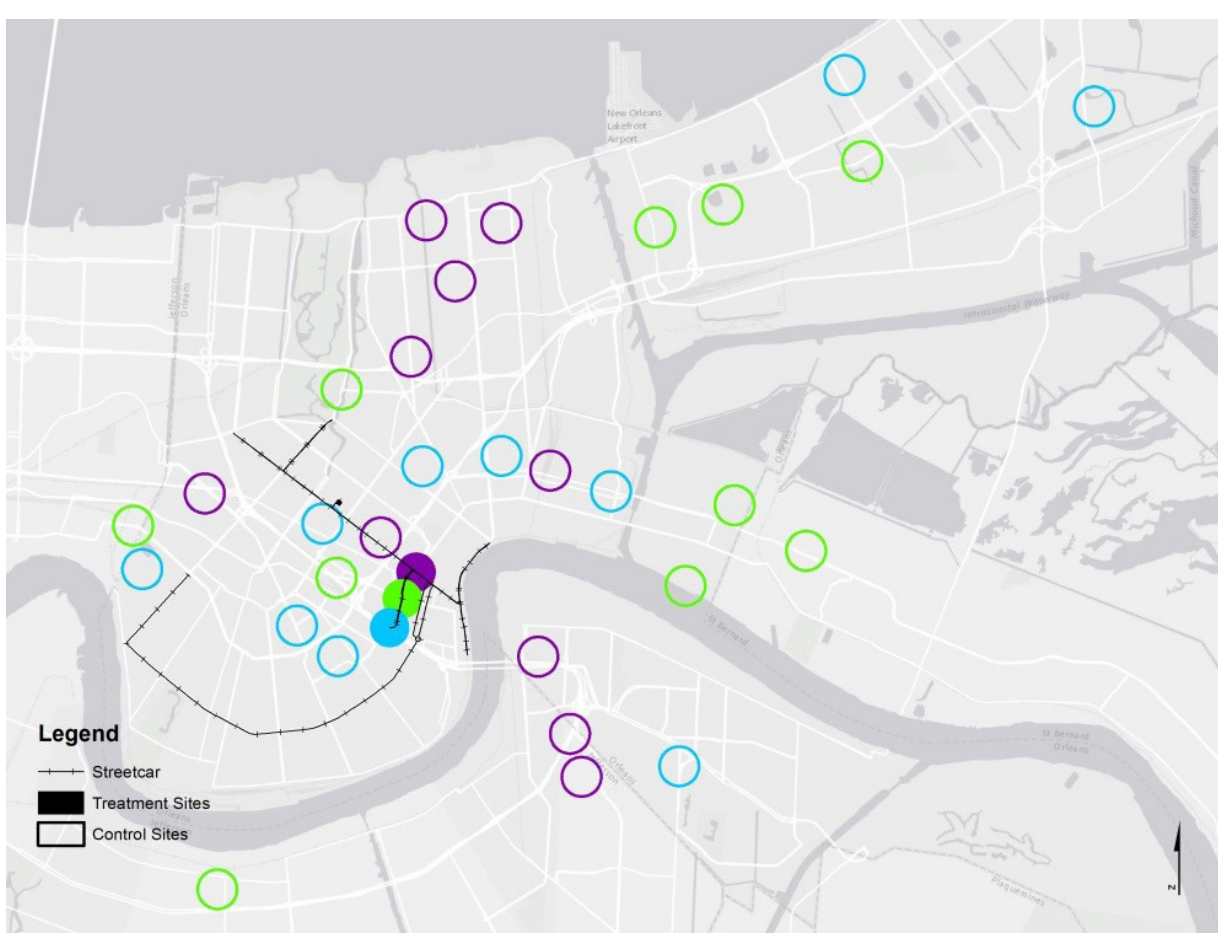


Figure 8 New Orleans, LA quarter-mile streetcar stations areas (solid circles) and matched control station areas (outlined circles).
Source: Hinners and Larice (2016)

Table 10 Descriptive and Shift-Share Results for New Orleans Streetcar Change in Jobs by Wage Category

	Control Station		Metro Area		Control Station Area Change	Metro Area Change	z	Control Station Area Shift-Share
Wage Category	Area 2008	Area 2013	2008	2013				
Lower Wage	5,799	5,577	194,588	215,300	-4.00%	11.00%	*	-840
Middle Wage	2,740	3,519	281,731	301,256	28.00%	7.00%	*	590
Upper Wage	6,348	5,389	163,927	168,019	-15%	2%	*	-1,117
Total	14,887	14,485	640,246	684,575	-3%	7%	*	-1,367