

INFLUENCE OF TRANSIT STATION PROXIMITY ON DEMOGRAPHIC CHANGE

Including Displacement and Gentrification with Implications for Transit and Land Use Planning After the Covid-19 Pandemic

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SUMMARY

A key purpose of fixed route transit (FRT) systems is to attract people and households to live near transit stations.

Using census American Community Survey 5-year sample data applied to 30 metropolitan areas for 2013 and 2019—a period between the Great Recession and the Covid-19 pandemic—we find:

- Nearly all people and households attracted to transit stations located within the first 100 meters with very little occurring in the rest of the “half-mile-circle” (about 800 meters).
- With the exception of streetcar systems that serve mostly downtowns, we find that most of the change in residents in the first 100-meters are minority persons which is somewhat inconsistent with displacement and gentrification expectations.
- Also, with the exception of streetcar systems, large to very large shares of all new households with children were attracted to the first 100 meters from transit stations, again somewhat inconsistent with expectations.

We conclude with long-term implications for transit and land use planning.

Research Questions and Design

We are interested in knowing how the demographic composition of the population and households have changed over time with respect to transit station proximity. We are also interested in knowing whether there is evidence of displacement and gentrification near stations accordingly.

- Over time and compared to their regions, does the demographic composition of people and households change over time with respect to transit station proximity?
- If so, does this change signal displacement or gentrification?

The questions lend themselves to pre-post descriptive research design

Data and Study Period

American Community Survey (ACS) data are used for this analysis. It includes reasonably detailed demographic data down to the block group (BG) level through its 5-year survey increments.

Fixed Guideway Transit Systems Studied

We apply our analysis to those LRT, BRT, SCT and HRT systems operating through most of the study period, 2013-2019.

List of Fixed Route Transit Systems Studied

Light Rail Transit	Year	Bus Rapid Transit	Year	Streetcar Transit	Year	Heavy Rail Transit	Year
Buffalo	1984	Arlington-Alexandria	2014	Atlanta	2014	Atlanta	1979
Charlotte	2007	Cleveland	2008	Dallas	2015	Cleveland	1955
Cleveland	1980	Eugene-Springfield	2007	Little Rock	2004	Miami	1984
Dallas	1996	Kansas City	2005	Portland	2001	Washington	1976
Denver	1994	Nashville	2009	Salt Lake City	2013		
Houston	2004	Pittsburgh	1977	Seattle	2007		
Minneapolis-St. Paul	2004	Reno	2010	Tacoma	2003		
Phoenix	2008	San Antonio	2012	Tampa	2002		
Pittsburgh	1984	San Diego	2014	Tucson	2014		
Portland	1986	San Jose	2005				
Sacramento	1987	Seattle	2010				
Salt Lake City	1999	Salt Lake City	2007				
San Diego	1981						
San Jose	1987						
Seattle	2003						
St. Louis	1993						
Virginia Beach	2011						



Figure 1. Location of Fixed Route Transit Systems Studied

ANALYTIC STRATEGY

- We use descriptive analysis of change between 2013 and 2019 with respect to distance from transit stations.
- Our analysis uses 100-meter (about 1/16th-mile) buffers around each transit station extended to 1600 meters (about one mile).
- We use a nearest point assignment whereby a block group (BG) is assigned to the closest 100-meter buffer.
- We report analysis to change in the first 100 meters (about one-sixteenth mile) around transit stations.

American Community Survey (ACS) and Other Variables Used, Change 2013-2019

Variables	Source	Variables	Source
Population			
Total Population	ACS	Housing Tenure	
Minority Population	ACS	Owner Households	ACS
Households			
Total Households	ACS	Renter Households	ACS
Households with Children	ACS	Household Income	
One-Person Households	ACS	Median Household Income	ACS
Householders Under 25	ACS	Median Household Income Ratio	Computed
Householders 65 or over	ACS	Geography	
		Station distance Bands in 100-meter increments*	Computed

CHANGE IN POPULATION BY MODE FOR EACH SYSTEM TO 1600 METERS

Our first analytic step is to array the change in population by 100-meter units for each mode to 1600 meters. Notice:

- The first 100-meter band for LRT, BRT and HRT systems accounted for nearly 15 percent of the change in population between 2013 and 2019 for their respective transit regions.
- For SCT systems, because they serve mostly downtowns, the first 100-meter distance band accounts for about five percent of the transit region’s population change.
- Only HRT systems show gains in share to about 800 meters (about one-half mile), otherwise the other modes show only negligible gains after the first 100 meters.
- Given this, we will use the 100-meter distance band to assess the distribution of change with respect to demographic and housing tenure changes.

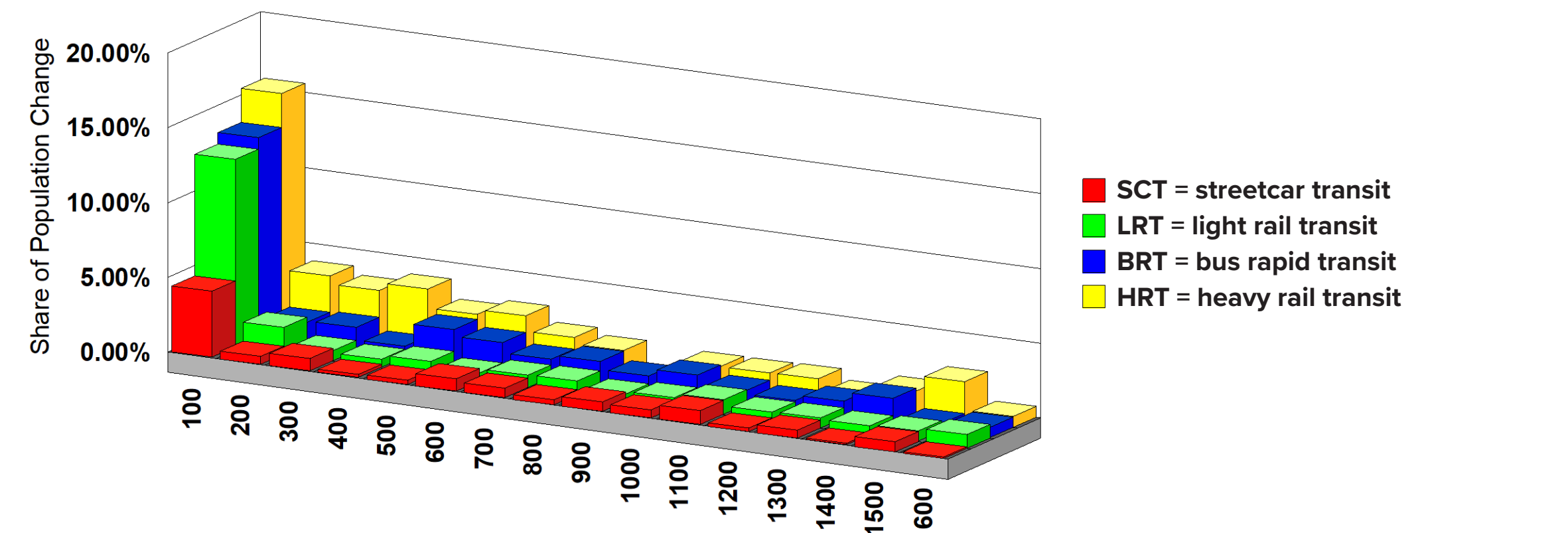


Figure 2: Distribution of Population Change in 100-meter Increments by Mode, 2013-2019 ACS 5-year Sample

Change in Demographic Characteristics in the first 100 Meters from Transit Stations by Mode

Our second analytic step is to analyze change in the 2013 and 2019 ACS 5-year samples for minority persons, selected household types, selected householder age groups, housing tenure, and median household income.

Change in Demographic Outcomes for Light Rail, Streetcar and Bus Rapid Transit Systems, 2013-2019

Metric	LIGHT RAIL TRANSIT			BUS RAPID TRANSIT			STREETCAR TRANSIT			HEAVY RAIL TRANSIT		
	Transit Region Change	100-meter Share of Regional Change		Transit Region Change	100-meter Share of Regional Change		Transit Region Change	100-meter Share of Regional Change		Transit Region Change	100-meter Share of Regional Change	
Population												
Total Population	3,062,468	384,435	13%	949,388	126,603	13%	1,068,336	47,564	4%	522,656	81,250	16%
Minority Population	1,677,323	198,653	12%	580,031	74,442	13%	588,764	11,468	2%	402,471	36,182	9%
<i>Minority Share</i>			85%	67%	59%	55%	77%	45%				
Households												
Total Households	1,053,609	163,820	16%	335,731	62,531	19%	402,560	25,730	6%	193,448	40,694	21%
Households with Children	144,824	27,998	19%	10,853	1,820	17%	35,556	(1,023)	0%	(1,023)	5,218	100%
<i>Households with Children Share</i>			14%	3%	3%	9%	0%	13%				
One-Person Households	252,347	56,389	22%	69,943	18,605	27%	125,381	14,768	12%	70,493	18,424	26%
One-Person Household Share	24%	34%		21%	30%		31%	57%		36%	45%	
2+ Adults without Children	656,438	79,433	12%	254,935	42,106	17%	241,623	11,485	5%	254,935	17,052	14%
<i>2+ Adults without Children Share</i>			62%	48%	67%	45%	60%	45%		64%	42%	
Householders Under 25	(58,580)	3,906	100%	(17,363)	2,585	100%	(21,027)	666	100%	(9,208)	1,183	100%
<i>Householders Under 25 Share</i>			0%	2%	4%	3%	0%	3%		0%	3%	
Householders 25-64	532,334	126,431	24%	122,458	39,357	32%	196,383	18,915	10%	53,403	30,007	56%
<i>Householders 25-64 Share</i>			51%	77%	63%	74%	74%			28%	74%	
Householders 65 or over	579,855	33,483	6%	230,636	20,589	9%	227,204	6,149	3%	149,253	9,504	6%
<i>Householders 65 or over Share</i>			55%	20%	33%	24%				77%	23%	
Housing Tenure												
Owner Households	451,819	52,676	12%	128,246	9,222	7%	164,651	3,991	2%	13,246	6,793	51%
Renter Households	592,601	110,771	19%	207,485	53,309	26%	237,909	21,739	9%	180,202	33,901	19%
<i>Renter Share</i>			57%	68%	85%	84%				93%	83%	
Median Household Income												
			DB Ratio 2013	DB Ratio 2019			DB Ratio 2013	DB Ratio 2019			DB Ratio 2013	DB Ratio 2019
Ratio 2013, 2019			0.93	0.85	0.80		0.82	0.89	0.89		0.97	1.04
Ratio 2019/2013				0.91	1.05			1.08	1.08			1.07

*Transit Region” means the counties served by a particular mode and not necessarily the metropolitan area.
 *100%” means the sector gained people or households in the distance band but lost people or households in the transit region overall, or that the sector gained more people or households in the distance band than the transit region overall.
 *0%” means the sector lost people or households in the distance band but gained people or households in the transit region overall.
 *Ratio 2013” and “Ratio 2019” mean the ratio of median household income in the first 100-meter distance band from transit stations to the median household income of the transit region for the 2013 and 2019 5-year ACS samples, respectively.
 *Urban Area” means the urbanized land area of the transit region in square kilometers.
 *100m DB Area” means the land area of the 100-meter distance band around transit stations in square kilometers.
 *DB Share” means the percent of the 100m DB Area to “Urban Area”.

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SUMMARY OF FINDINGS

Minority Population

- Minority population is defined as total population less “White, Alone” as defined by the census.
- For Light Rail Transit the rate of change in minority persons within 100 meters of LRT transit stations was about the same as for the total population.
- Trends were roughly similar for BRT systems.
- In contrast, because they serve mostly downtown areas, the first 100 meters around SCT systems accounted for a very small share of the change in total and minority populations.
- Trends within 100 meters around HRT stations were roughly between LRT and BRT stations, and SCT stations.
- With the exception of HRT stations, we find that on the whole the share of change in minority population living within 100 meters of transit stations was comparable or slightly less than the change of the population as a whole but not remarkably different.

Households by Type

- With respect to households with children**
 Conventional wisdom assumes that households with children would not locate near transit stations while households without children and especially single person households would. We find surprises.
- Except for streetcar stations, the area within 100 meters of transit stations accounted for large shares of the change in this household type.
- For LRT, BRT and HRT stations, these households accounted for nearly a fifth of the total change in such transit region households although the nominal numbers are modest
- One reason might be that households living near stations in 2013 had children and either decided to stay because they preferred the location to moving or perhaps could not find suitable or affordable housing elsewhere.
- Regardless of the reason, we suggest that transit and land use planners may be underestimating the market demand for households with children to live near transit stations.

With respect to single person households and multi-adult households without children

- There is little surprise when it comes to single-person households choosing to live near transit stations.
- Across all modes, the change in the share of these households living within 100 meters of transit stations grew at a rate of about a quarter to half again faster than for the transit region as a whole.
- However, they accounted for relatively small shares of total change in such households, ranging from 12 percent near SCT stations to 27 percent near BRT stations.
- Households comprised of two or more adults without children accounted for about half of the change in households in all transit regions except in the BRT transit region where they accounted for about two-thirds.

With respect to Households by Householder Age

- Conventional wisdom also holds that households comprised of younger householders—notably those under 25 years of age—would dominate growth in households near transit stations.
- While this may have been the case in prior years, during our study period of 2013-2019 younger households accounted for very small shares of the total change in households in the 100-meter distance band, between just two to three percent.
- One reason for this is simply demographic change, as households with householders under 25 years of age have been losing share of total households since the late 1990s.
- There were fewer households in this age group in 2019 than in 2013 in all transit regions.
- But every transit region saw an increase in this age group within 100 meters of transit stations which would seem to reinforce the conventional wisdom that proximity to transit stations retains its allure to younger households.
- However, with respect to households comprised of older householders—those 65 years of age or over—conventional wisdom is supported namely that they are not attracted to transit stations.

The largest share of the demand for living near transit stations is households without children but households ranging from 25 to 64 years of age, being about three-quarters in all except the BRT transit regions where it was about two-thirds.

Housing Tenure

- In all regions, renters accounted for well over half the change in housing tenure.
- Renters accounted for 93 percent of the tenure share in HRT regions.
- In all but HRT regions, renters accounted for even larger shares of change within 100 meters of transit stations.
- While renters accounted for 83 percent of the change in tenure near transit stations in HRT regions, more than half of saw a small gain in owner households near those stations

Household Income as an Indicator of Displacement

- If incomes are rising faster near transit stations than the region as a whole, this would be an indicator of gentrification.
- If the ratio of 2019 distance band income to transit region income is greater than 1.0, incomes are rising faster near transit stations than transit regions as a whole suggesting gentrification and displacement occurs.
- For all but LRT regions, the 2019/2013 ratios are higher than 1.0.
- For LRT regions, the ratio of 0.91 suggests incomes near transit stations are lagging considerably relative to LRT regions. For BRT and SCT regions.
- However, just because the 2019/2013 ratios are greater than 1.0 does not necessarily mean those areas are attracting incomes higher than the region.
- Indeed, 2019 median household incomes near transit stations in those regions are well below their transit regions as a whole.
- The change between 2013 and 2019 may reflect movement of the market toward the regional mean, but still falls considerably short.

KEY POLICY INSIGHTS

Limited Attractiveness of Transit Station Proximity to People and Households with Surprises

- We are surprised by the limited spatial extent to which transit stations apparently attract residential development, being almost entirely within the first 100 meters.
- One reason is purely the friction of distance. Those choosing to live in locations accessible to transit may want to live as close as they can to them to reduce the time and distance it takes to access its services.
- One surprise is the demand among households with children to live near transit stations.
- Planners may need to rethink the role of transit station proximity to serve these households.
- Another surprise is small number of householders under 25 years of age who located near transit stations.

Limited Evidence of Displacement and Gentrification

- There is limited evidence of displacement and gentrification close to transit stations but this is consistent with other case study research.
- Except for streetcar station areas that mostly serve downtowns, about half to two thirds of growth within the first 100 meters of transit stations is among minority persons.
- While median household incomes near stations is increasing over time relative to the regional mean, we do not find the change is substantial.
- We find that median household income in 2019 near transit stations is only about the average for proximity to HRT stations and otherwise below for the other modes.

Limited Attractiveness of Transit Station Proximity to People and Households with Surprises

- We should expect that transit stations confer rent and price premiums per square foot and higher prices are usually a recipe for higher income households to displace lower income ones. This may not be happening for two reasons:
- Just because rents might be higher per square foot does not mean necessarily that households are displaced because lower-moderate income households will pay the higher rent if other transportation costs are reduced.
- Also, many cities are aware that transit stations may have undesirable price effects on housing for lower- and moderate-income households and implement a range of strategies to ameliorate adverse outcomes.

Demand for Transit Station Proximity after the Covid-19 Pandemic

- The long-term location demand influences associated with the Covid-19 Pandemic may be nominal.
- Large shares of households living in metropolitan areas prefer to live in communities that are walkable and accessible to transit.
- The Community Preference Survey conducted by the National Association of Realtors during the Covid-19 period shows that about half of all households in the 50 largest metropolitan areas want to live in walkable communities and about half of them (about one-quarter overall) want to be able to walk to transit.
- But fewer than half of these households live in walkable communities or in homes accessible to transit.
- Meeting the post-Pandemic demand for living near transit stations will require that existing systems be expanded, new systems added, and efforts redoubled to facilitate market demand for living near transit stations, which we address next.

Long-Term Implications for Transit and Land Use Planning

Areas near transit stations absorb a share of regional development that is exceedingly disproportionate to its land area.

Intensity of Household Change in the First 100-Meter Distance Band from Transit Stations by Mode, 2013-2019

Mode	1st 100-meter Land Area, km2	1st 100-meter Share of Urban Area	1st 100-meter Household Growth
Light Rail Transit	58.0	0.2%	163,820
Bus Rapid Transit	116	1.0%	62,531
Streetcar Transit	22	0.2%	25,730
Heavy Rail Transit	33	0.5%	81,250

Mode	Share of Transit Region Household Growth	1st 100-meter New Households per km2	1st 100-meter New Households per Square Mile
Light Rail Transit	16%	2,824	7,314
Bus Rapid Transit	19%	541	1,400
Streetcar Transit	6%	1,183	3,063
Heavy Rail Transit	21%	2,455	6,358

In LRT transit regions, 16% of all household growth occurred on just 0.2% of the transit region’s land area.

In LRT regions, household density increased by more than 2,800 households per square kilometer or more than 7,000 per square mile.

New population growth in those transit regions grew by about:
 15,000 persons per square mile for LRT systems;
 5,000 persons per square mile for BRT systems;
 6,000 persons per square mile for SCT systems, and
 12,000+ persons per square mile for HRT systems.

These findings lay the foundation for post-COVID-19 transit and land use planning.