# The Influence of Rail Transit on Development Patterns in the Mountain Mega-Region with Implications for Transit and Land Use Planning



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# ABSTRACT

Between 2020 and 2050, states of the U.S. Mountain West states of Arizona, Colorado, New Mexico, Nevada and Utah will be among the top 10 fastest growing states.

## Top 10 US States Ranked by Projected Growth, 2020-2050

-			-	
Rank	NAME	Population 2020	Population 2050	2020-2050 Change
	UNITED STATES	335,058	426,439	27%
1	NEVADA	3,136	4,856	55%
2	TEXAS	29,612	45,072	52%
3	ARIZONA	7,360	11,080	51%
4	Florida	21,858	32,585	49%
5	UTAH	3,231	4,787	48%
6	NORTH CAROLINA	10,694	15,252	43%
7	COLORADO	5,839	8,321	43%
8	WASHINGTON	7,666	10,783	41%
9	NEW MEXICO	2,187	3,060	40%
10	IDAHO	1,768	2,465	39%

Note: Population in thousands. Mountain West states in bold Source: Census

When their vast public lands are excluded from developable land, these arid states are among the mostly densely settled in the country.

### Distribution of Federal, State and Local Ownership among Mountain West **States**

State	State Land Area (acres)	Total Federal, State, Tribal (acres)	Percent Federal, State, Tribal	Non Federal, State, Tribal (acres)
Arizona	72,731	58,845	81%	13,886
Colorado	66,387	27,254	41%	39,133
New Mexico	77,674	39,077	50%	38,596
Nevada	70,276	58,124	83%	12,152
Utah	52,588	39,306	75%	13,281
Total	339,655	222,607	66%	117,048
<b>MW Average</b>	67,931	44,521	<b>66%</b>	23,410
48 State Ave.	36,149	6,542	18%	29,608

Note: Figures in thousands of acres. MW means Mountain West. Average 48 States excludes MW states as well as Alaska and Hawaii. Source: Adapted from National Wilderness Institute (http://www.nwi.org/Maps/LandChart.html)

With rapid growth and land constraints, the largest metropolitan area in the Mountain West have initiated or planned rail transit systems such as light rail, streetcar, or commuter rail transit to address transportation needs.

Among many purposes of these forms of transit systems are to attract development including jobs and people to areas near transit stations. We address the extent to which the transit systems deployed by metropolitan areas in the Mountain West achieve these broad objectives by:

- Estimating market premiums for proximity to transit stations;
- Measuring the share of the region's new jobs that locate near transit stations; and
- Measuring the share of the region's population and households that locate near transit stations.



The Mountain West states (AZ, CO, NM, NV, and UT) comprise the southerr part of the Mountain census division. . Source: Census

We find that the market will greatly respond in cities that provide the changes to regulations and built environment that favor transit use near

We demonstrate that these stations are capturing a disproportionate share of growth compared to their land area. Demand for proximity to transit is strong enough to consume projected growth in these metropolitan areas to 2050.

We consider the implications of these findings for the future of the Mountain West, with recommendations for development of station areas.

# REAL ESTATE MARKET PREMIUMS WITH RESPECT TO TRANSIT STATION PROXIMITY

holding other factors constant? Model:

**R** is the asking rent per by CoStar during 2017 **S** is the bundle of struc reported by CoStar: Gross leasable area Effective year built Vacancy rate

Stories

Office - Class A or Class B Retail - Power Center, Neighborhood Center,

Community Center, Regional Mall, Lifestyle Center, transit station outward to two miles. Outlet Mall

# more than 0.25 mile to 0.50 mile.



Is there an association between commercial real estate rent (per square foot) and proximity to rail transit stations

## $R_{i}=f(S_{i'}, SES_{i'}, U_{i'}, L_{i'}, DB_{i'}, M_{i'})$

er square foot for property <i>i</i> reported	<b>SES</b> is Median Household Income for the block group from the 2016 American Community Survey (ACS)
cture attributes for property i	<b>U</b> is two dimensions:

L is two dimensions:

Distance from Freeway Interchange **DB** is the location of the subject property within one-

Workers per Labor Force Member

Distance from Downtown

Entropy as a measure of land use mix

Multifamily - Senior or Student housing

eighth (0.125) mile distance bands of the nearest rail **M** is comprised of the individual metropolitan counties

within which the rail transit systems operate



Example station area distance bands

In this example, Tucson streetcar distance bands are station to 0.125 mile, more than 0.125 mile to 0.25 mile, and

Source: Robert Hibberd; basemap image from ESRI ArcGIS Online (see https://www.arcgis.com/home/group. html?id=702026e41f6641fb85da88efe79dc166#overview).



	DENVER		Р	HOENIX			SALT LAKE CITY	٢	
DB	Office	Multifamily	Retail	Office	Multifamily	Retail	Office	Multifamily	Retail
0.125	0.066	0.053	0.125					0.068	0.234
0.250	0.065	0.061	0.039		0.049		0.090	0.067	0.111
0.375	0.065		0.025		0.090				
0.500	0.056	0.034	0.026						
0.625	0.047	0.062	0.044						
0.750	0.026	0.045	0.041						
0.875		0.095	0.057						
1.000		0.098	0.033						
1.125		0.060	0.026						
1.250									
1.375		0.031							
1.500		0.051							
1.625									
1.750									
1.875									
1.000									
Performance									
Cases	4,978	2,360	1,347	1,318	2,453	1,249	417	461	331
R2, adj	0.167	0.369	0.115	0.413	0.373	0.234	0.293	0.366	0.164
F-ratio	38.037	50.199	45.828	35.358	53.102	13.676	7.386	10.464	3.152
Rent	\$22.43	\$1.58	\$22.08	\$18.90	\$1.04	\$17.48	\$19.20	\$1.13	\$ 19.12

**Results for Streetcar Transit (SCT) and Commercial Rents** 

	SALT LAKE CI	TY	TUCSON				
DB	Office	Multifamily	Retail	Office	Multifamily	Retail	
0.125				-0.158	0.456	0.791	
0.250				0.282	0.321	0.280	
0.375				0.245	0.230		
0.500				0.409	0.329		
0.625				0.442	0.209		
0.750							
0.875				0.266			
1.000							
1.125							
1.250							
1.375							
1.500							
1.625							
1.750							
1.875							
1.000							
Performance							
Cases	28	2 445	N	a <u>367</u>	786	494	
R2, adj	0.35	6 0.385	N	a 0.256	0.418	0.233	
F-ratio	8.06	7 10.937	N	a 5.833	21.161	6.773	
Rent	\$19.3	7 \$1.13	N	a \$17.47	\$0.91	\$16.42	

**Results for Commuter Rail Transit (CRT) and Commercial Rents** 

	ALBUQUERQU	E		DENVER	
DB	Office	Multifamily	Retail	Office	Mu
0.125				0.483	
0.250	0.194			0.256	
0.375	0.182			0.204	
0.500	0.107			0.211	
0.625	0.101			0.083	
0.750	0.125			0.072	
0.875	0.223				
1.000	0.105			0.050	
1.125	0.065				
1.250	0.132				
1.375					
1.500	0.141				
1.625	0.162				
1.750					
1.875					
1.000					
Performance					
Cases	780	351	1,078	2,409	
R2, adj	0.183	0.48	0.061	0.26	
F-ratio	7.469	12.955	3.672	32.331	
Rent	\$14.79	\$1.00	\$13.29	\$24.34	

### **Overall Assessment**

LRT systems have positive commercial rent premiums to about 1.00 mile or more in Denver but only to about 0.25 mile in Salt Lake City, and less than 0.50 mile in Phoenix for only multifamily.





## THE DISTRIBUTION OF JOBS WITH RESPECT TO TRANSIT STATION PROXIMITY

Do rail transit station areas capture proportionately more jobs than their regions over time? We evaluate the change in the shares of jobs over three discrete time periods extending from before the Great Recession of the late 2000s, through

- the Great Recession itself, and afterward • <u>2004-2007</u> covers the period of relatively constant growth from the early 2000s to the end of 2007. We call this the "pre-recession"
- 2008-2011 covers the period of the Great Recession. According to Nelson, Stoker and Hibberd (2018), rail transit station areas should retain if not capture a higher share of the shift of regional jobs than their regions as a whole. This is the "interrupted period."
- 2012-2015 covers the period after the Great Recession that we call "post-recession". This is the post-test period. Based on our theory, rail transit station areas should capture a higher share of the shift of regional jobs than their metropolitan areas as a whole. Whether this share in the shift would be higher than predicted during the Great Recession we cannot say, but we can predict it should be higher than the prerecession period.

We look at a range of distance bands:

period

• The increment from the station centroid to 0.125 (one-eighth) mile;

- The increment from than 0.125 mile to 0.25 (one-quarter) mile;
- The increment from more than 0.25 mile to 0.50 (one-half mile); and The total from the station centroid to 0.50 mile

Change in Jobs to 0.50 Mile from Light Rail & Streetcar Transit Stations Before, During and After the Great Recession

Metro Area & Metrics	Station Area Change 2004-07	Transit Region Share 2004-07	Station Area Change 2008-11	Transit Region Share 2008-11	Station Area Change 2012-15	Transit Region Share 2012-15
	Light Rail Transi	it Station Job (	Change and Sha	re Cumulative	to 0.50 Mile	
Denver	-		_			
Total Job Change	9,077	14.7%	(5,780)	na	6,220	5.3%
Station Area (sq.mi.)	34.6	4.9%	34.6	4.9%	34.6	<b>4.9</b> %
Phoenix						
Total Job Change	8,111	4.9%	(5,594)	na	14,214	8.7%
Station Area (sq.mi.)	21.3	1.6%	21.3	1.6%	21.3	1.6%
Salt Lake City						
Total Job Change	10,570	22.4%	(17,455)	na	10,063	16.6%
Station Area (sq.mi.)	28.8	9.7%	28.8	9.7%	28.8	9.7%
	Streetcar Transi	t Station Job C	Change and Sha	re Cumulative	to 0.50 Mile	
Salt Lake City						
Total Job Change	(1,383)	-0.7%	(1,727)	8.7%	638	0.3%
Station Area (sq.mi.)	2.6	0.9%	2.6	0.9%	2.6	0.9%
Tucson						
Total Job Change	4,553	4.8%	7,012	-292.7%	(612)	-3.9%
Station Area (sq.mi.)	4.0	1.5%	4.0	1.5%	4.0	1.5%
Note: "na" means both the station ar	eas and transit regions lost jo	bbs.				

	Streetcar Transit St	ation Job Char	nge and Share	Cumulative to 0.50 M
Salt Lake City			•	
Total Job Change	(1,383)	-0.7%	(1,727)	8.7%
Station Area (sq.mi.)	2.6	0.9%	2.6	0.9%
Tucson				
Total Job Change	4,553	4.8%	7,012	-292.7%
Station Area (sq.mi.)	4.0	1.5%	4.0	1.5%

**Overall Assessment** 

Light rail appears to attract jobs toward transit stations in larger shares than land area. For instance, while comprising less than 10% of the transit area's urban land, the area within 0.50 mile of transit stations in the Salt Lake City metro area absorbed about 17% of the region's job growth. More impressive is Phoenix where less than 2% of the land area within 0.50 mile of transit stations accounted for about 9% of the job growth. The situation is reversed with respect to streetcar transit. One reason may be that SCT systems operate in substantially built out areas that reduce their ability to attract jobs.









# **PEOPLE AND HOUSEHOLDS**

Relative to the counties within which transit systems operate ("transit counties"), is proximity to rail transit stations associated with increases in people and households?

- The research question lends itself to pre-post quasi-experimental design: • <u>2000-2009</u> covers the period of relatively constant growth from the early 2000s into the Great Recession which technically ended in 2009 which we call the pre-recession period and
- <u>2010-2016</u> covers the period after the Great Recession that we call the "post-recession" period.
- Data for the analysis come from the decennial 2000 and 2010 census, and the American Community Survey (ACS). We use descriptive statistics comparing changes before and after the Great Recession, using z-scores.

Share of Demographic Change within 0.50 Mile of Mountain West Metropolitan Area Transit Stations

	Denver L	RT			Phoenix	LRT			Salt Lake	City LRT		
Metric	Change 2000- 2009	Share of Transit Counties	Change 2010- 2016	Share of Transit Counties	Change 2000- 2009	Share of Transit Counties	Change 2010- 2016	Share of Transit Counties	Change 2000- 2009	Share of Transit Counties	Change 2010- 2016	Share of Transit Counties
Basic Demographics					Stati	on to 0.50 /	Mile Cumu	lative				
Total Population	7,960	3.6%	19,241	<b>9.2</b> %	697	0.0%	3,573	2.0%	16,478	16.9%	12,268	<b>20.9</b> %
Total Households	5,665	6.5%	10,340	13.0%	(1,562)	-0.3%	1,347	5.1%	5,718	18.7%	4,237	<b>20.9</b> %
HH with Children	(4,824)	18.2%	6,488	11.6%	(10,387)	-8.6%	1,263	8.7%	1,311	-15.1%	1,832	<b>19.6</b> %
2+ Adult HH no Child	5,083	11.5%	592	<b>6.2</b> %	7,363	3.0%	(356)	1.0%	2,637	15.4%	1,304	24.3%
One Person HH	5,406	9.9%	3,260	23.2%	1,294	1.0%	440	7.4%	1,770	19.0%	1,101	20.8%
<b>Geographical Share</b>												
Station Area (sq.mi.)			3.1	<b>4.9</b> %			2.2	1.6%			2.9	<b>9.7</b> %
	Salt Lake	City SCT			Tucson S	СТ						
Metric	Change 2000- 2009	Share of Transit Counties	Change 2010- 2016	Share of Transit Counties	Change 2000- 2009	Share of Transit Counties	Change 2010- 2016	Share of Transit Counties				
Basic Demographics			Stati	on to 0.50	Mile Cumu	lative			_			
	1.10	0.10/	1005		17700	5.00/		0.1.0/				

basic Demographics		Station to 0.50 Mile Cumulative						
Total Population	143	0.1%	(225)	0.7%	(7,723)	-5.3%	1,774	8.1%
Total Households	186	0.5%	330	1.5%	(936)	-2.5%	786	5.5%
HH with Children	(319)	13.3%	(216)	-0.6%	(1,351)	-2.8%	302	1.2%
2+ Adult HH no Child	84	0.3%	393	6.6%	324	-2.2%	189	-1.0%
One Person HH	421	2.8%	153	2.9%	91	-0.7%	295	5.1%
Geographical Share								
Station Area (sq.mi.)			2.6	0.9%			4.0	1.0%

"sq.mi." means square mile (multiply by 2.59 for conversion to square kilometers). All differences between periods have z-scores indicating p < 0.0 **Overall Assessment** 

People and households are attracted to station areas at a rate many times more than the land area.

For LRT and SCT systems, households are attracted to areas within 0.50 mile by two to five times more than the land area.

## PERSPECTIVES ON THE ROLE OF TRANSIT IN THE FUTURE OF THE MOUNTAIN WEST'S LARGEST METROPOLITAN AREAS

Two themes emerge from this research.

**First,** the real estate market values proximity to various forms of transi estate beyond the standard half-mile circle that seems to dominate transit-oriented development (TOD) planning.

**Second,** for the most part change in jobs, people and households is confined to the very closest areas around transit stations.

There is a growing literature based on market surveys indicating that people would choose to live a half mile away, or more, from transit • Surface parking lots, stations if they had the opportunity. One indicator of this willingness is • Vacant, privately owned land, and

- the presence of market premiums for light rail and streetcar proximity. Local planning may not seize market opportunities for maximizing
- Development regulations that are inconsistent with market realities; Unpredictable or protracted development approval processes
- Excessive parking requirements;
- Neighborhood opposition;
- Inefficient linkages between development and transit stations (such parking lots and aging, low intensity structures. as multi-lane highways, long blocks, and elevated station platforms among others); and
- Insensitive urban design that makes transit station accessibility physically and even emotionally unpleasant.

But for these barriers, more jobs, people and households are likely to locate within a half mile, a mile or more from transit stations

Market surveys produced by the National Association of Realtors market confers a premium on rents for many kinds of commercial real indicate that even if all new housing built between 2010 and 2050 were within 0.50-mile of existing transit stations, market demand for housing proximate to transit stations would remain unmet.

> Moreover, land area within 0.50 mile of transit stations in Albuquerque, Denver, Las Vegas, Salt Lake City, Phoenix and Tucson metropolitan areas is comprised mostly of:

- Land on which there are one- and two-floor structures being more

than 30 years old and occupying less than 25% of the land area. development throughout the half-mile circle or beyond. Barriers include: Much of the Mountain West's market demand for living and working near transit stations can be accommodated through the redevelopment of parking lots, vacant land, and aging buildings that are already beyond their highest and best use.

• Development exactions that exceed that needed to mitigate adverse The greatest challenge for the largest metropolitan areas of the Mountain West—and others—is to meet the market demand for jobs and housing near rail transit stations by simply facilitating the redevelopment of its

