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Types of Rail Transit Systems and the Movement of College Educated Young Adults into the Center of Large American Cities

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Abstract

In this paper, we look at the association between three types of rail transit (light rail, heavy rail, and commuter rail) and the movement of college-educated young adults into the central city of the 51 largest American Metropolitan areas. We describe eight possible transit system types based on combinations of heavy, light, commuter and bus transportation systems. We find that the presence of a light or heavy rail transit system in a city is associated with a statistically significant increase in the percent of the young college-educated living within three miles of the urban center. Commuter rail was not a significant predictor of an increase. Cities without rail service are significantly less likely to experience an increase in the percent of the young college educated living close-in.

Background

Rising Appeal of Living within 3 Miles of the City Center to College Educated Age 25-34[1]

1. From 2000 and 2012, the percent of young college educated adults living close-in to city centers rose 37.3%.
2. This was nearly double the 19% increase overall in similar people throughout the 51 largest metro areas.
3. In 2000 these educated young adults were 77% more likely to live close in than other metro residents. In 2012 they were 126% more likely to live within 3 miles of the city center.
4. Over this time period, 49 of the 51 largest cities saw an increase in the percent of the young college educated living close-in.

Recent Investments in Urban Rail

1. Between 1975 and 1999 capital expenditures for rail transit grew from $1.4B to $9.2B in 2002 dollars.[2]
2. 31 light rail systems were built or have expanded since 1984.
3. Between 1995 and 2013, public transportation ridership rose 37.2 percent, almost double the amount of population growth at 20.3 percent.[3]

Hypotheses

Hypothesis 1: Cities with light and/or heavy rail systems will experience more increase in the percent of young college graduates residing in close-in neighborhoods than cities with only commuter rail or bus service.

Hypothesis 2: Cities with recently built commuter rail systems (new start) will experience a larger increase in the percent of young college graduates moving close-in than cities with old commuter rail systems (legacy).

Hypothesis 3: Controlling for city size and percent white, the presence of light rail and/or heavy rail will predict an increase in the percent of college graduates 25-34 living close-in.

Rail System Typology[4]

	Sub-categories	Regulatory Agency	Geographic Scale
Freight Rail	Class I; Regional Rail; Shortline	FRA	National/Regional Network
Passenger Rail	Amtrak; Alaska Railroad; High Speed Rail	FRA	National Intercity Connectivity
Commuter Rail	Legacy; New Start	FTA, FRA	Greater Metropolitan Commuter Shed
Urban Rail Transit	Light Rail (Street Cars); Heavy Rail (Subway or Metro)	FTA	Intra-Urban/Downtown

Three Types of Urban Rail Transit:

1. Heavy Rail (Subways or Rapid Transit) moves large numbers of passengers on separated right-of-way.
2. Light Rail (or Street Car) moves fewer passengers at grade with street traffic.
3. Commuter Rail (regional or suburban rail) moves from suburbs to center on shared track corridors with freight and Amtrak.

Analysis

Control Variables for Regression Analysis

- 2010 Population of center city in metropolitan area from U.S. Census Bureau
- 2010 Percent white in center city from U.S. Census Bureau

Correlations

*P < .05 **P < .01 *** P < .001

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Delay in Hours	1									
1. Change in Grads close-in	.10	1								
1. 2010 Population	.53 ***	.03	1							
1. % White	-.48 ***	-.05	-.29 *	1						
1. % Black	-.20	.00	-.09	-.37 **	1					
1. % Hispanic	.41 **	.18	.32 *	-.19	-.37 **	1				
1. Commuter Rail	.52 ***	.18	.30 *	-.20	-31 *	.28 *	1			
1. Light Rail	.17	.31 *	-.04	-.15	-.13	-.04	.23	1		
1. Rapid Transit	.58 **	.29 *	.42 **	-.40 **	.13	.12	.46 **	.13	1	
1. Buses Only	-.42 **	-.42 **	-.24	.29 *	.07	-.08	-.43 **	-.85 ***	-.44 **	1

Predictors of the increase in the percent of young adult college graduates living close-in

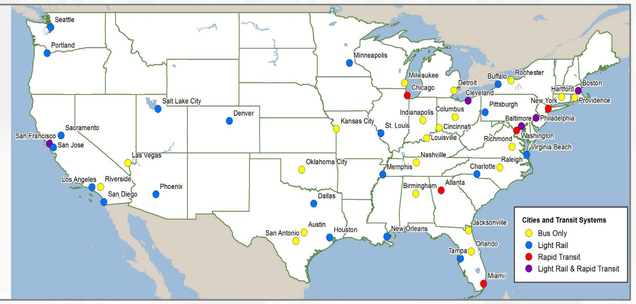
*P < .05

Model	B (standard error in parentheses)	Beta	T
Constant	10.177 (35.341)		.288
2010 City Population	-1.328E-6 (.000)	-.055	-.365
Light Rail	16.617 (8.116)	.281	2.047*
Heavy Rail	22.777 (11.265)	.317	2.022*
2010 Percent White	.341 (.462)	.110	.738

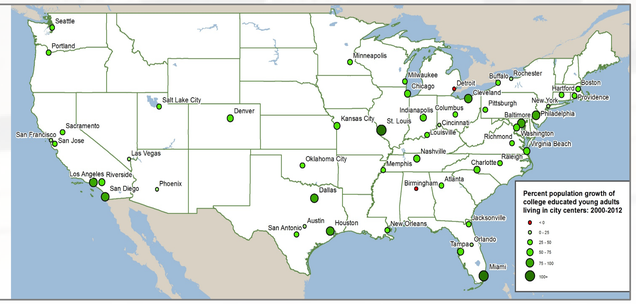
Cities by Rail System Types and Population Growth

Percent of Cities By Transit System Type:

- Bus System: 100 percent (51 cities)
- Light Rail System: 51 percent (26 cities)
- Heavy Rail System: 21 percent (11 cities)
- Commuter Rail System: 39 percent (20 cities)
  - New Start: 14 cities
  - Legacy: 6 cities



Transit System Type	#	%	% Change in Young College Graduates Living Close-in
Bus, no rail system	18	35.3	35.3
Light rail and bus	11	21.6	57.1
Heavy Rail and Bus	0	0.0	NA
Commuter Rail and Bus	3	5.9	35.7
Light Rail, Heavy Rail and Bus	2	3.9	60.5
Light Rail, Commuter Rail, and Bus	8	15.7	48.8
Commuter Rail, Heavy Rail and Bus	4	7.8	65.8
Light, Heavy, Commuter Rail and Bus	5	9.8	37.3



Results

Hypothesis 1: Cities with light and/or heavy rail systems experienced significantly greater increases in the percent of young college graduates residing close-in (54%) than cities with only bus service or commuter rail and bus service (35%).

Hypothesis 2: Not supported by the analysis. However cities with new start commuter rail systems did experience a greater increase in the percent of young college graduates living close in than cities with legacy systems. The difference failed to reach significance.

Hypothesis 3: Controlling for city size and percent white residents, light rail and heavy rail were both significant predictors of the increase in the percent of young college graduates living close-in. Neither city size nor percent white were significant.

Discussion

The findings suggest that rail transit is an amenity that attracts young college graduates to a city. But causality here is complex. The cities that have other attractive features such as jobs and cultural and social resources are probably more likely to invest in rail. This appears to be a function of population size. Also, the association between the availability of light and heavy rail and the change in the percent of young college graduates residing close-in could be due to the demographics and size of the cities rather than the presence of light rail.

New start commuter rail and most light rail systems were built after 1975—a time when urban renewal and the first wave of post war suburbanization had come to an end. Cities with new start commuter rail have attracted a greater increase in the percent of young college graduates living close in than have cities with legacy systems. We created a new variable (recent rail) by adding the cities with a new commuter rail system to those with a recent light rail system. This variable replaced light rail in the model. The beta for the variable recent rail was not significantly greater than that for light rail.

Taken together these results are consistent with the widely held belief that rail systems will lure higher income individuals into the inner city. But clearly more studies are needed, as it seems likely that light rail impacts location choices and related development under some conditions and not others.

References

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