BUT DO LOWER-WAGE JOBS FOLLOW?
Comparing Wage-Based Outcomes of Light Rail Transit to Control Corridors

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Abstract

Literature suggests that rail transit improvements should be associated with more jobs and perhaps increasing share of jobs in a metropolitan area. Literature and some research also suggest that such improvements should increase the number of lower-wage jobs accessible to transit. In this paper, we assess both in the context of all 11 light rail transit systems built in metropolitan areas of fewer than eight million residents in the nation since 1981. Using census block-level job data over the period 2002 to 2011, we evaluate change in jobs and change in metropolitan area job share for all jobs, and lower- and upper-wage jobs for selected light rail transit (LRT) corridors and comparable corridors in each of these 11 metropolitan areas. Overall, we find little difference between the LRT and control corridors in both attracting new jobs and new lower-wage jobs, or in changing relative share of jobs compared to their metropolitan areas, though systems built since 2004 appear to have fared slightly better in both respects. We view these results as generally supportive of LRT employment-related objectives. Planning and policy implications are offered.

Introduction

Scholars and civil rights organizations assert that America’s transportation policies perpetuate social and economic inequity. Sanchez and Brenman (1) for instance, show that highway-based transportation investments limit low income and people-of-color access to education, jobs, and services. Echoing their concerns is the Leadership Conference Education Fund (2, 3), a civil rights organization which asserts that low-wage jobs are inaccessible to those who are transit-dependent. Public transit is seen as one way in which to connect people to low-wage jobs, reduce poverty, increase employment, and help achieve social equity goals (4, 5).

In recent decades, such transit has included light rail systems. Unlike bus systems, rail transit is viewed by the real estate market as a long-term commitment by government to providing a transit service. A growing number of studies report a relationship between new rail transit investment and job growth (6). But do rail transit investments attract lower-wage jobs?

Our paper addresses this question. It begins with a review of literature on the relationship between light rail transit (LRT) and lower-wage job change. We then evaluate the change in lower-wage jobs between selected LRT corridors and comparable (“control”) corridors for 11 metropolitan areas with LRT systems in descriptive and economic base terms (using location quotients) over the 10-year period 2002 through 2011. For this, we use one-half mile buffers from the centerline of each corridor. We continue with half-mile circle analysis of lower-wage job change for about half those systems between 2007 – to year before the Great Recession – and 2011 – two years into recovery. We conclude with implications.

Literature

Fan, Guthrie and Levinson (7) provide an especially pertinent review of literature addressing our question. Citing Kain's pioneering work (8) they observe that the urban poor are harmed for want of affordable housing near job opportunities and reliable public transit to connect them to those jobs (see also 9, 10).

One limiting factor in gaining access to lower wage jobs is that the income from such jobs is often insufficient to buy and operate an automobile to access those jobs in the first place. Sanchez (11) and Sanchez, Shen, and Peng (12) note that it is diffiucult for public transit to reduce the spatial mismatch between lower income jobs and residential options for a number of reasons One problem is that bus systems often do not provide sufficient service for the kinds of working hours that make low-skill/entry-level, temporary, and evening/weekend shift-work jobs feasible (13). Public transit, especially if it is more rapid and reliable than conventional buses – a feature of LRT systems – is seen as a way to connect lower income urban workers from their lower income neighborhoods to lower-wage jobs (7).

Unfortunately there are very few empirical studies showing whether and the extent to which LRT generates these outcomes. It seems that just as many studies show a positive outcome (14, 15, 16) as there which show small or ambiguous associations (17, 18, 19).

Two recent studies have further shown different results. In the first, McKenzie (20) studies neighborhoods in Portland, Oregon to identify differences in transit access for those neighborhoods. Using 2000 Census and 5-year 2005–2009 American Community Survey data, McKenzie compares changes in levels of transit access across neighborhoods based on their concentrations of blacks, Latinos, and poor households. The study found that neighborhoods with high Latino concentration have the poorest relative access to transit and that transit access declined for black and Latino-dominated neighborhoods. McKenzie did not evaluate job growth along transit lines serving or near those neighborhoods, however.

The second is the study by Fan, Guthrie and Levinson (7). They find that residential proximity to light rail stations and bus stops offering direct connection to rail stations are associated with statistically significant gains in accessibility to low-wage jobs (Fan, Guthrie and Levinson: 29). On the other hand, their overall regression equations explained only about 20 percent of the variation in change in low wage jobs between 2004 and 2007. The Center for Transportation Research at the University of Minnesota (2010) goes further by reporting that between 2004, when the Hiawatha Line LRT line opened, and 2007 just before the Great Recession low-wage jobs accessible within 30 minutes of transit within Hennepin County grew by 14,000 with another 4,000 where the LRT was accessed directly by bus.

Nonetheless, the question remains: If light rail transit is provided, will lower-wage jobs necessarily follow as some may assume?

Research Design, Study Areas and Data

As were are interested in know whether and the extent to which there are more lower-wage jobs locating along LRT corridors over time, we will use a quasi-experimental, longitudinal study approach. We apply our analysis to 11 all LRT systems operating in metropolitan areas of fewer than eight million population: Charlotte (opened in 2007), Dallas (1996), Denver (1994), Houston (2006), Phoenix (2008), Portland (1986), Sacramento (1987), Salt Lake City (1999), San Diego (1981), Seattle (2009) and Twin Cities (2004).

Unlike all other studies, we compare change in lower-wage jobs over time between treatment (LRT) and control corridors. Just because an LRT corridor experienced a change in jobs does not mean necessarily that the change would have occurred anyway along that corridor or relative to other corridors it would have seen more or fewer jobs.

For each of the 11 LRT systems we match one LRT corridor with a control. Our criteria are:

- Within the same metropolitan statistical area;
- Equal length;
- Existing transit route;
- Direct with no doubling-back;
- Anchored on both ends (unless the original line was not);
- Anchors of equal magnitude; downtowns, transit centers, shopping centers, malls, etc.;
- Along a major corridor;
- Similar land use mix along the corridor where both corridors contain substantial commercial development;
- Conformity with existing rapid transit plans; and
- Similar relative nearness to a parallel freeway in both distance and degree.

Given these overall criteria, there are operational considerations. Many of the metropolitan areas analyzed have only as single light rail corridor, dictating the selection. For metropolitan areas with more corridors, ones that began operation between 2002 and 2011 were preferred. When no such corridor was available, corridors between regional-scale use such as airports were avoided as representing major confounders.

For comparable corridors, the emphasis was placed on creating control corridors that be viable as transit corridors. This meant that corridors were contiguous and followed a continuous existing right-of-way that was viable as a transit corridor. Availability of right-of-way was the primary concern, and this dictated either existing major roads or existing railway right-of-way. For the former, highways and major arterials were preferred. For the latter, this meant the majority of right-of-way needed to follow an existing rail corridor.

For the Dallas DART system, the Red line was used as a transit corridor. The 29.3-mile light rail corridor opened in 1996, and runs from Parker road in Plano to Westmoreland. The comparable corridor follows an existing railroad corridor (one of the few not used for later DART lines).

For the Denver, the RTD light rail’s Southwest Corridor was used as the transit corridor. It is an 8.7 mile corridor stretching from downtown Denver to Littleton. For a comparable corridor, the Northwest corridor, an existing rail corridor stretching from Denver Union station to Broomfield was used.

For the Portland MAX system, the yellow line corridor was used, running between Expo center and Portland State University. It is 5.8 miles long, and began operations in 2005. The comparable corridor is a parallel path to the yellow line, on the east side of I-5, along Albina Avenue, and then along Martin Luther King Boulevard for a similar length.

For the Sacramento Regional Transit light rail, the Southern extension to the Blue line was used. The section is about 5.5 miles long, and began operations in 2003. The analysis portion runs from the southern beltway to Meadowview Road. The comparable corridor was a Southern Pacific railroad corridor running parallel to the line, characterized by similar types of land uses.

For the Salt Lake TRAX system, the 400 South University line was used, running from downtown to the University of Utah. For a comparable corridor, 2100 South, a comparable arterial that also links into the rest of the TRAX system was used.

For the San Diego Trolley, the Mission Valley East extension to the Green line was used. It stretches from Mission San Diego to La Mesa, and began operations in 2005. It stretches 19.4 miles. As a comparable corridor, a corridor origination in Mission San Diego northward along I-5, and then east to Mira Mesa was used. Both corridors run parallel to freeway corridors for much of their length.

For the Charlotte Metro area LYNX light rail, running along the South Boulevard between I-485 and downtown Charlotte. It is a 9.6 mile corridor that began operations in 2007. For a comparable corridor, the planned blue line extension. This corridor extends along an existing railroad corridor from downtown Charlotte to UNC Charlotte.

For the Houston METRORail light rail line, the Red line, a 6.7 mile corridor stretching from the University of Houston to the Reliant Park (Astrodome) in the south, along surface streets. For a comparable corridor, a route running along existing arterial roads was used. It ran from the Houston CBD to the Galleria, along Gray Street, Westheimer Road, and Post Oak Boulevard.

For the Minneapolis-St. Paul metropolitan area, 8.8 miles of the Hiawatha corridor (now part of the METRO transit Blue line) from downtown Minneapolis to the Minneapolis-St. Paul International Airport was used. The corridor began operations in 2004. The comparable corridor follows a portion of the proposed Southwest Corridor light rail, originating in Minneapolis along the existing railroad corridor toward St. Louis Park, then towards Hopkins, ending at Shady Oak road.

For the Metro Light Rail in Phoenix, Arizona the original 20 mile corridor began operations in 2008. It stretches from the city of Glendale in the north, where it is anchored by a Walmart, through downtown Phoenix, past Sky Harbor international airport, past Arizona State University's main campus, and into downtown Mesa. The comparable corridor starts in downtown Phoenix, then eastward past the Banner Desert Medical Center, to Mesa Community College, ending at Fiesta Mall.

For the Seattle metro area, the 1.6 mile Tacoma LINK light rail was used as the analysis corridor. It began operations in 2003, and stretches northward from the Tacoma Dome CRT station to the

Theatre district. It is branded as light rail, and the guideway is built to light rail standards, but it uses Inekon trams as rolling stock. The comparable corridor is located in Everett, linking the Everett Station for the Sounder Commuter Rail to the Everett Naval station, past the Historic Everett Theatre.

Our principal source of job data is the Census Bureau's Longitudinal Employer and Housing Dynamics (LEHD). Since 2002 (but only since 2004 in the case of Phoenix), 2-digit NAICS job data have been reported at the census block level. Among other data reported are wage brackets of workers. Those brackets are less than $1,250 per month, between $1,250 and $3,333 per month, and more than $3,333 per month. Unfortunately, the wage brackets are not adjusted for inflation over time. The consumer price index changed by 25 percent between 2002 and 2011, the latest year reported. Thus, over time, some workers earning wages in a lower bracket will have crept into a higher bracket as a function merely of inflation. Our analysis addresses this as follows.

We use two key measures: share of a metropolitan area's jobs by wage bracket that are along each corridor between two points in time, and location quotient which is the local share of jobs in a given bracket relative to the metropolitan area's share where an LQ >1.0 means the local area has a greater concentration than the metropolitan area as a whole. Even with bracket creep, since we use shares and LQs between points in time we will uncover changes in shares and concentrations over time between the control and transit corridors.

The reason we have used the term "lower-wage" to this point in the paper is that we combine the lower and middle wage brackets into a single "lower-wage" bracket. This further helps control for bracket creep from the lower wage into the middle wage bracket during the study period.

Procedurally, we assign each census block to a corridor if its centroid falls within 0.50 mile of the centerline of the corridor.

Results

Table 1 reports share results for three combinations of corridors: the oldest 6 corridors where LRT systems were implemented before 2004 (and for which we have no LEHD data for prior years); the newest 5 corridors where LRT systems were implemented in or after 2004; and all 11 corridors. Table 2 reports LQ results. For the 6 oldest LRT corridors, we use 2004 as our base year of analysis as it includes all 11 LRT systems, given that LEHD data for Arizona began being reported that year.

From Table 1, we see that regardless of the vintage of the LRT groups (the oldest 6 or the newest 5) or LRT systems as a whole in our study, there is no substantial difference between the control and LRT corridors. The share and change in share of total jobs in their respective metropolitan areas between the control and LRT corridors remained about the same over the study periods. While both groups lost some jobs in the lower-wage group this may be a function of wage bracket creep into the upper wage bracket, but again there is no substantial difference between the control and LRT corridors.

Table 2 shows some different trends, however, in the concentrations of jobs. Although there is essentially no difference in the concentration or change in concentration of lower- or upper-wage jobs among the 6 oldest LRT lines used for analysis over the study period, there appear to be substantial differences among the newest 5 LRT lines. While the LRT corridors lost job concentration in the lower-wage category at faster pace than the control corridor, on the other hand the LRT corridors gained job concentration in the upper-wage category at a faster pace. This may be a combination of wage bracket creep and that LRT corridors attracted more jobs on the whole than the control corridors.

Implications

Overall, we find that compared to control corridors, light rail transit corridors perform about as well in attracting jobs overall. Moreover, the distribution and change in distribution of jobs by lower- and upper-wage categories over time are also similar between the older corridors as well as the weighted sums for all corridors. On the other hand, newer LRT corridors appear to have concentrated more upper-wage jobs than control corridors.

There are several limitations to our analysis. Perhaps the most important is that Census LEHD wage data are not adjusted for inflation over time. We recommend that the Census Bureau build in periodic adjustments to the recorded wage brackets or expand the brackets perhaps in $100/month increments.

A second limitation is timing. None of the LRT lines we studied actually opened in the same year with a range from 1994 (Denver) to 2009 (Seattle). Job-sorting associated with LRT may occur in the initial years of operations followed by a lull before large scale redevelopment of depreciated property along the lines becomes economically feasible – perhaps more feasible than comparably depreciated property along control corridors. Related to the timing issue is that perhaps many more areas along LRT corridors are built-out than in the control corridors, which will the delay the time in which developed property is rebuilt.

Third, we considered only total jobs and jobs by two wage brackets. We did not consider other forms of development, such as residential. This is an area of analysis we will be reporting at a later time.

Fourth, our terminating year, 2011, is really part of a slow recovery from the Great Recession. Results reported by Fan, Guthrie and Levinson for the Twin Cities were based on the period 2004 to 2007, a time of economic robustness. It may not be until LEHD data are reported in the middle 2010s that we can fairly compare LRT corridor outcomes to control corridors covering the period of economic expansion from the early 2000s to the Great Recession, through the Great Recession to full recovery, and then post-recovery.

Fifth, in most of metropolitan America and in the case of all the LRT systems included in our study, highway-based economic activity has had a multi-generational head start over alternative modes. This did not used to be case; before the Great Depression American metropolitan economies were closely tied to transit systems, often privately-provided ones. In the half century since the end of World War II, only five metropolitan areas added heavy rail to their transportation options (Atlanta, Los Angeles, Miami, San Francisco Bay Area and metropolitan Washington, DC) while only about a dozen added light rail (those included in our study plus Los Angeles and the San Francisco Bay Area). The 21st century may be seen as a return t fixed-guideway transit options but only by historians comparing the 20th to the 21st centuries.

Sixth, the LRT alignments of many of the earlier LRT lines may not have maximized economic interactions. Portland's first light rail line was sandwiched between an Interstate freeway and a gulch; accessing light rail stations meant walking over the freeway or down the gulch to staircases/elevators.

Much of the Sacramento light rail system is built in the median of major highways. Modern LRT systems do better at integrating stations with their service areas often at-grade with easy walking to mixed-use destinations.

Lastly, we cannot know the counter-factual; that is, how would the LRT corridors performed compared to our control corridors if LRT was not constructed in the first place? We suspect but cannot prove that the LRT investments sustained economic activity along those corridors, and further that without those investments economic activity may have declined. Our reasoning is consistent with urban economic literature showing that as highways become increasingly congested, economic activity disperses to newly developing locations. Regional economic expansion continues but at marginally declining levels as the cost of exchange mounts (21, 22). A key role of transit is to mitigate transportation congestion effects of agglomeration (23). Voith (24) characterizes public transit as essentially “noncongestible” and is best suited to sustaining agglomeration economies in downtowns and secondary activity centers, and along the corridors that connect them. LRT may be a key element of sustained economic improvement over the long term.

Although our results are mixed, we view them as a cautious endorsement of light rail and implicitly other forms of modern fixed-guideway transit options over the long term. Still, investments in these systems should not be seen as a panacea for advancing local economies in the short term.

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Table 1
LRT and Control Corridor Share Results

LRT Groups	Total Jobs	Metro Share	Lower Wage Jobs	Upper Wage Jobs	Total Jobs	Metro Share	Lower Wage Jobs	Upper Wage Jobs
Oldest 6 LRT	***Control Corridor***				***LRT Corridor***			
Base Year 2004	408,165	5.7%	249,950	158,215	673,853	9.5%	401,618	272,235
End Year 2011	437,494	5.5%	219,027	218,467	726,675	9.2%	352,544	374,131
(End Year/Base Year)	7.2%	-3.8%	-12.4%	38.1%	7.8%	-3.2%	-12.2%	37.4%
Newest 5 LRT	***Control Corridor***				***LRT Corridor***			
Base Year 2004	359,440	6.5%	202,287	157,153	695,793	12.6%	383,749	312,044
End Year 2011	384,926	4.7%	175,627	209,299	738,770	9.0%	314,802	423,968
(End Year/Base Year)	7.1%	-28.1%	-13.2%	33.2%	6.2%	-28.7%	-18.0%	35.9%
All 11 LRT	***Control Corridor***				***LRT Corridor***			
Base Year 2004	767,605	6.1%	452,237	315,368	1,369,646	10.8%	785,367	584,279
End Year 2011	822,420	5.1%	394,654	427,766	1,465,445	9.1%	667,346	798,099
(End Year/Base Year)	7.1%	-15.9%	-12.7%	35.6%	7.0%	-16.0%	-15.0%	36.6%

Table 2

LRT and Control Corridor Location Quotient Results

LRT Groups	**Lower Wage LQ**	**Upper Wage LQ**	**Lower Wage LQ**	**Upper Wage LQ**
Oldest 6 LRT	***Control Corridor***		***LRT Corridor***	
Base Year 2004	0.92	1.15	0.90	1.20
End Year 2011	0.88	1.16	0.85	1.20
(End Year/Base Year)	-5%	1%	-5%	-0%
Newest 5 LRT	***Control Corridor***		***LRT Corridor***	
Base Year 2004	0.88	1.22	0.8595	1.2517
End Year 2011	0.80	1.27	0.7444	1.3422
(End Year/Base Year)	-9%	4%	-13%	7%
All 11 LRT	***Control Corridor***		***LRT Corridor***	
Base Year 2004	0.90	1.19	0.8775	1.2311
End Year 2011	0.84	1.21	0.7974	1.2697
(End Year/Base Year)	-7%	2%	-9%	3%