THE IMPACT OF DALLAS (TEXAS) AREA RAPID TRANSIT LIGHT RAIL STATIONS ON TAXABLE PROPERTY VALUATIONS

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ABSTRACT: Public transit agencies in the United States often claim that one of the benefits of rail transit systems is increased development on properties in the immediate area of rail transit stations. However, the scant professional literature on the subject fails to consistently show such an impact. This paper reports the findings of our analysis of the impact of the presence of a light rail station on immediate-area property valuations for the Dallas (Texas) Area Rapid Transit agency. Based on county appraisal district data for 1997-2001, median valuations of office properties increased 24.7 percent around light rail stations compared to 11.5 percent in a control group of properties. Similarly, single-family-and multifamily residential property valuations grew faster around the stations than in the control neighborhoods. However, retail properties showed no meaningful valuation growth differences and results indicate that light rail stations may be a disincentive for industrial properties.

1. INTRODUCTION

As population gains in metropolitan areas lead to increased traffic congestion, public attention is drawn to the development of a broader range of public transportation options. Outside of older eastern seaboard and upper-Midwest cities, public transportation in the United States has largely been based on bus transit. However, over the past three decades, transit rail has seen an increase in interest with several systems being planned, developed or expanded. This new interest has not come without controversy.

Opponents of rail transit development often point out that rail transit systems must be subsidized to cover shortfalls between operating costs and the fares riders are willing to pay. For some systems, such as the Metro in Washington, DC and the Hong Kong transit system, administrators claim that operating shortfalls are covered through rents paid by tenants of system-owned properties. However, many of the newer systems do not own substantial amounts of land from which to draw rents. These systems rely on local tax revenues for critical income. This reliance on public subsidies has created the need for transit systems to justify their existence – typically beyond traffic congestion reductions and pollution abatement. One such justification has been to look for evidence that rail transit systems enhance nearby property valuations thus demonstrating positive public amenities of the transit systems beyond ridership.

This paper reports the findings of our analysis of the impact of the presence of a light rail station on immediate-area property valuations in the Dallas (Texas) Area Rapid Transit (DART) system. Funding for the research was provided by DART. The analysis follows up on our previous work in which we found that a sample of properties around DART light rail stations saw their values rise faster than overall valuations in Dallas County. However, this analysis expands on our earlier work by taking a census of all properties located within a one-quarter mile radius area of the rail stations and comparing the increases in property valuations to a group of similar properties not within the study area. In the following section, we examine relevant existing literature on the impacts of rail transit systems.

2. LITERATURE REVIEW[1]

A considerable body of research has emerged on the question of the impact of urban rail transit systems on residential and commercial property values. In what follows, a sample of the published research is summarized and examined for insights that may help to shed light on how the presence of Dallas' light rail transit system is impacting property values.

Throughout the 1960s, considerable attention was focused on the comparatively broad issue of how transportation infrastructure influences urban form and, consequently, urban property values (Alonso, 1964; Mills, 1967; Muth, 1969). The impetus of this research was the notion that urban property values are influenced by accessibility, defined commonly as the straight-line distance of a given property from the central business district (CBD) (Kain and Quigley, 1970). In other words, any significant improvement in the transportation system that increases accessibility and reduces transportation costs should be capitalized in land values and should result in land-use changes.

Intuitively, this is a readily understood and convincing argument. Empirical research, however, paints a decidedly more complicated picture. One in-depth review of this issue concluded that empirical research has seldom supported theoretical expectations (Giuliano, 1989). A more recent review concludes that the capitalisation effects of rail transit are actually extremely modest and highly variable (Cervero and Landis, 1995).

Interest in the impacts of rail systems on property values began to emerge in the early-1970s with the construction of "new generation" rail transit systems in San Francisco, Washington, D.C. and Atlanta, of which more will be said shortly (Giuliano, 1989). The first study of this ilk examined the suburban land use impacts of Philadelphia's Lindenwold high-speed rail line, which replaced a conventional rail system in 1969 (Boyce *et al*., 1972). This research concluded overall that the Lindenwold system had resulted in transportation savings and, consequently, had some positive impact on property values. But, it also muddied the issue by suggesting that the positive impacts of rail transit on property values

[1] Much of the literature review presented here is drawn from our 1999 study (Weinstein, Gross, and Clower). The authors wish to gratefully acknowledge the efforts of Dr. Harold Gross in helping to prepare this section of the report.

were more apparent in lower- and middle-class neighborhoods than in higher-income areas (Mudge, 1974; Allen and Mudge, 1974; Boyce *et al*., 1976).

San Francisco's Bay Area Rapid Transit (BART) system has received the greatest attention from researchers. The earliest BART study to look at impacts on residential property values yielded mixed results: only a handful of the neighborhoods studied showed noticeable impacts on property values (Lee, 1973). Two more studies concluded that BART had encouraged the decentralization of both population and employment in the Bay Area, which seems to suggest downward pressure on inner-city property values (Webber, 1976; Dyett *et al*., 1979). Several other studies, meanwhile, concluded that BART depressed adjacent property values for a variety of aesthetic and social reasons, including increased noise and vibration, increased automobile traffic, the perceived accessibility of lower classes to previously higher income neighborhoods, and architecturally insensitive design treatments of rail stations (Dornbush, 1975; Burkhardt, 1976; Baldassare *et al.*, 1979). At least four studies have found that BART exerts a positive influence on property values. One identified a positive effect on properties located within 1,000 feet of a BART rail station (Blayney Associates, 1978). Landis *et al*. (1994) found a premium on homes with good access to the BART system. The real contribution of this particular study, however, may be that it identified an effect two decades after BART service began; in other words, there probably is a significant time lag involved in the capitalisation of transportation improvements (Giuliano, 1986). These findings are expanded in Cambridge Systematics' 1998 report and a 1999 study by the Sedway Group (1999)to include multifamily, office and retail properties in addition to single-family homes. This research shows clear rent gradients for both central business district (CBD)/urban and suburban stations. In a contrast for industrial land uses, Landis *et al*. (1995) found no property value impacts for the five California rail transit systems.

Washington D.C.'s Metro system has received scrutiny in three studies. Two concluded that the impact of rail transit on property values was, at most, indirect and limited to areas characterized by other favorable factors such as the availability of developable land, positive economic, political and social conditions, and coordinated government policies for development (Lerman *et al*., 1978; Damm *et al*., 1980). Their findings supported two earlier studies which reviewed and reinterpreted the then extant body of research on rail transit capitalisation and determined that rail does little to promote real economic growth absent these supporting factors (Knight & Trygg, 1977a; 1977b). A third Metro study found that rail encouraged the decentralization of population and employment and, consequently, tended to lower property values in older neighborhoods (Paget Donnelley, 1982).

In Atlanta, researchers discovered that rail transit had virtually no impact on property values (Nelson and McCleskey, 1989), and a study of Miami's Metrorail system came to the same conclusion (Gatzlaff and Smith, 1993). Over the past decade, Portland's MAX rail transit system has also received attention. In two studies, only very modest and spotty impacts on property values were identified (Arrington and Davis, 1987; Al-Mosaind *et al*., 1994). Results of a

third study hold that rail transit has had virtually no impact on property values (Dueker, 1997).

Finally, in our earlier analysis (Weinstein, Clower, and Gross, 1999) we found that a sample of properties located around DART rail stations saw increases in property values and rents greater than overall county levels as well as a sample of comparable non-DART properties. The greatest gains observed were for Class A and C office buildings and retail strip centers.

Several explanations have been advanced for the weak and inconsistent empirical relationship identified between rail transit and property values. An obvious starting point is the straightforward argument that the basic theoretical construct -- i.e., that rail transit improves accessibility and therefore affects land values and use - is ill-conceived. Some studies, in fact, have claimed that rail systems do not impact accessibility because they tend to serve few origins and destinations, and they carry a very small share of the total number of trips in an area (Hamer, 1976; Meyer and Gomez-Ibanez, 1981). In other words, rail transit systems should not be expected to affect land use.

Another simple explanation for the counter-intuitive conclusion of most of the empirical research is that rail systems simply haven't been given sufficient time to impact adjacent properties. The case here is that the durability of capital stock implies long time lags in land-market responses to changes in the transportation system (Giuliano, 1986). This would appear to be the case with San Francisco's BART system, if recent research on its impacts mentioned above is to be believed (Landis *et al.*, 1994).

A third problem concerns measurement technique. If the model is correctly specified and the data are sufficiently mature, can the specific influence of rail transit be distinguished from other, confounding factors? One persistent criticism of the empirical research cited above has been that the methodological complexities involved in isolating the effect of any one factor on land values over several years make it unlikely that impacts can be measured, even if they exist (Giuliano, 1986).

In summary, the empirical research of the past three decades -- though not without flaws - reveals that the capitalisation effects of rail transit systems are not easily generalizable. These mixed signals suggest that the impacts of rail transit systems on nearby property values may be highly localized and contextual. In the following sections we describe our current approach to measuring the impact of DART rail stations on near-by property values and present our findings.

3. METHODOLOGY

This research is an extension of our previous work, which examined changes in property values for a sample of properties located near DART rail stations. In our current work, we examine property value changes for a census of properties located within one-quarter mile of a DART rail station. These changes are compared to changes in property values of similar neighbourhoods that are not proximate to DART rail stations.

In this analysis we chose to exclude properties located in the Dallas Central Business District. With the extensive use of tax increment financing funds to renovate properties and spur development in the central business district, we believe that measuring any unique impacts of DART rail would be nearly impossible in a statistically valid manner.

The study areas are defined by one-quarter mile radius circles centered on the 23 stations located outside of the Dallas central business district (see Table 1). This includes some stations, such as Galatyn Park, Forest Jupiter, and Downtown Garland that opened during 2002. (Figure 1 provides a map of the existing and planned transit rail system.) These newly opened stations are included because their potential impacts will already be reflected in market valuations of surrounding properties. While it is likely that any effect of the presence of DART rail stations on surrounding property values will extend beyond our arbitrary boundary, we feel that the effect will diminish rapidly beyond the study area for each station.

The key to identifying potential unique effects of DART rail stations on property valuations is the careful selection of a group of control properties that share similar location and market characteristics. For example, DART rail stations are located at the intersection of significant thoroughfares. Therefore, our control group properties are located within a one-quarter mile radius area at the next intersection outside of the rail station area. In several cases, the rail station area and control group area are effectively contiguous. In other instances, the control group area is not contiguous, but there is just a few hundred feet separation between the areas.

Our examination separates the properties into distinct market classes including multi-family residential, single-family residential, office, retail, and industrial. Single-family properties include single-family homes as well as duplex and triplex detached houses, where two or three homes are included in one building. Multi-family properties include quad-plex detached housing, condominiums, apartments, and townhomes. We have further separated residential properties into two categories of having or not having improvements (vacant) in 2001. This analysis looks at changes in taxable property values between 1997 and 2001 based on data obtained from the Dallas County Central Appraisal District. While some researchers have expressed concern about the reliability of appraisal district data on property valuations, we believe that any variance in taxable versus actual market value will be effectively controlled because of the very large numbers of properties examined. In other words, differences in taxable valuations that may be due to the variance in individual property owner behavior in challenging taxable assessments average out when all properties are considered. Moreover, we have no reason to believe that there is any difference in the average behavior of property owners in the study group versus the control group as it relates to property value assessments.

The data were screened for obvious data entry errors. We also excluded outliers, which are defined as property value changes falling more than three standard errors away from mean property value changes. These exclusions

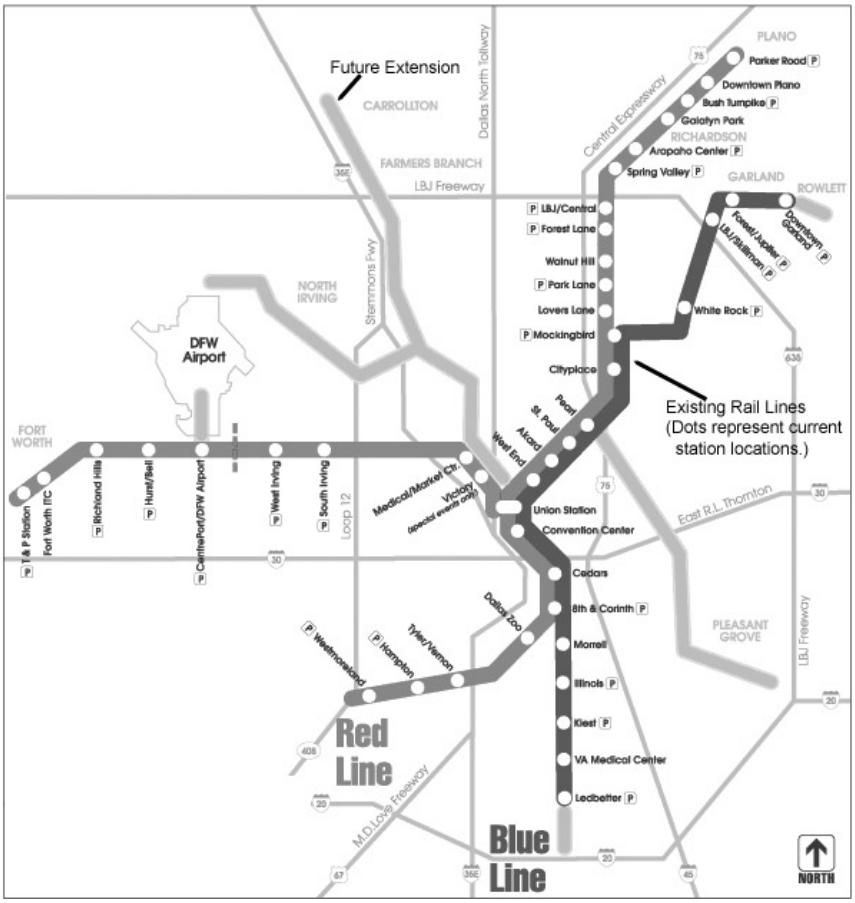

Figure 1. Dallas Area Rapid Transit Light Rail System.
Source: www.dart.org

Table 1. DART Light Rail Stations Examined.

Station Names		
Arapaho	Kiest	Spring Valley
Cedars	LBJ/Central	Tyler/Vernon
City Place	LBJ/Skillman	VA Hospital
Corinth	Ledbetter	Walnut Hill Lane
Forest Lane	Lovers Lane	Westmoreland
Galatyn Park	Mockingbird Lane	White Rock
Hampton	Morrell	Zoo
Illinois	Park Lane	

included a very few study and control group properties totalling less than one percent of the total properties examined in this analysis. In addition to reporting mean valuation changes, we have included median value changes so that individual properties showing large changes in valuation do not overly influence our interpretations of the data.

4. FINDINGS

Table 2 shows the results of the data analysis. The number of properties is each group is indicated by the "N=" notation. Focusing on median valuation change, to limit the influence of particularly large value properties, office properties within one-quarter mile of the transit rail stations increased in value during the study period 24.7 percent compared to 11.5 percent for non-station properties. Similar results are found for single-family residential properties, which showed a 38.2 percent increase in residence median value nearest to a transit station versus a 20 percent gain for those in the control group. Multifamily property values also rose more rapidly in the station group, though the effect is not nearly so pronounced as in single-family properties with increases of 42 percent and 34.8 percent for the station and control groups, respectively.

In contrast, residential properties in the station group that are zoned for single-family dwellings, but are vacant lots, saw no change in median values, and practically no change in mean values. Meanwhile, the median value of similar properties in the control group rose by 16.7 percent. There are no vacant lots zoned for multifamily dwellings within one-quarter mile of any non-CBD light rail station.

Retail properties show very similar gains with only a 2.1 percent difference in the change in median values for station properties and properties in the control group – a difference we find negligible. Retail properties located closest to the rail stations saw median value increases of 28.3 percent compared to 30.4 percent for the control group. Industrial properties located farther away from the light rail stations experienced substantially larger gains in median property values compared to those located within one-quarter mile. The median value of control group industrial properties increased 21.5 percent between 1997 and 2001, while station properties saw a weaker 13.0 percent increase. In the following section, we examine these changes in more detail.

5. DISCUSSION

The findings of this analysis confirm the expected impacts of higher market values for residential and office properties located in close proximity to a light rail station. DART rail is an amenity-enhancing service most keenly affecting the market values of properties where people live and where there are comparatively high concentrations of non-industrial jobs – offices. While mean value changes for office properties are approximately equal for the two groups, the control group's figures are substantially influenced by a relatively few cases that did not meet our criteria as outliers. As noted, examining the median values presents a

Table 2. Changes in Property Valuations.

	Mean Valuations ($)		Median Valuations ($)	
	Control	**DART**	**Control**	**DART**
Office (Control N = 121, DART N = 47)				
1997	3,583,075	7,423,207	331,450	519,240
2001	4,605,140	9,415,885	369,460	647,730
Total Change	1,022,065	1,992,678	38,010	128,490
% Change	28.5	26.8	11.5	24.7
Single-Family Residential (Control N = 3,486 DART N = 3,027)				
1997	70,375	45,053	43,185	70,375
2001	97,292	63,366	51,820	97,292
Total Change	26,917	18,313	8,635	26,917
% Change	38.2	40.6	20.0	38.2
Multi-Family Residential (Control N = 1,189 DART N = 428)				
1997	40,234	64,388	19,350	36,190
2001	53,114	80,497	26,080	51,390
Total Change	12,880	16,109	6,730	15,200
% Change	32.0	25.0	34.8	42.0
Single-Family Residential-Vacant (Control N= 208, DART N= 410)				
1997	6,935	3,285	3,000	2,500
2001	6,670	3,284	3,500	2,500
Total Change	-265	-1	500	0
% Change	-3.8	0.0	16.7	0.0
Retail (Control N = 155, DART N = 111)				
1997	610,474	1,003,157	230,000	243,000
2001	765,015	1,233,385	300,000	311,730
Total Change	154,541	230,228	70,000	68,730
% Change	25.3	23.0	30.4	28.3
Industrial (Control N = 158, DART N = 104)				
1997	845,951	599,020	234,900	221,180
2001	977,915	739,291	285,405	250,000
Total Change	131,964	140,271	50,505	28,820
% Change	15.6	23.4	21.5	13.0

Source: Dallas County Central Appraisal District (authors' calculations).

more accurate assessment of market changes, especially when there is a large variation in the base values of the properties.

We expected to find a greater impact on multifamily properties compared to single-family residential property values. Without supporting literature, our expectations were based on the premise that, especially in Texas where average behavior tends toward increased automobile usage, people residing in high-density dwellings would demand closer access to the light rail system, and thus increase the relative market value of the properties. While this contention is

supported by our findings, it appears that residents of single-family dwellings are also considering close proximity to a light rail station as a property amenity.

Interestingly, the findings were not consistent for vacant-lot, single-family residential properties. This could illustrate that the most desirable vacant properties near DART stations have already been developed. Also, the vacant residential properties in this analysis are largely located in the southern sector of Dallas, which has on-going market challenges not related to public transportation.

Retail properties show no meaningful difference in the change in median values between outlets located near the rail stations and those in the control group. We attribute this to DART rail not yet being a large influence on the shopping-location decisions of local residents. Retail property values are influenced by proximity to target markets, ease of transportation access, and the visibility of the site. Given current consumer behavior, retail properties located within one-quarter mile of a DART rail station are competitive with other comparable locations.

Industrial properties showed a potential disincentive to being located near a DART rail station, which is consistent with the findings by Landis *et al.* (1995). One hypothesis to explain this difference is that the presence of transit rail lines could interfere with site ingress and egress for large commercial motor vehicles delivering raw materials and picking up finished goods. In addition, several of the control group locations have freight rail access, which is not typically run directly parallel and in close proximity to light rail tracks. For these occupants, unfettered access to rail transportation is more important that employee convenience.

6. CONCLUSIONS

We have recently completed a related study involving key informant interviews about the impacts of light rail on property development and land use planning. Property developers, urban planners, and elected municipal officials in the Greater Dallas area who were interviewed invariably believe that the presence of a light rail station is a boon to development or redevelopment in the area immediately surrounding the station. Having real estate developers, planners, and public officials supporting new developments around existing and future rail station sites presents a challenge in interpreting some of our findings. It is possible that property values around future stations may increase not because of future occupant demand, but because of developer and real estate investor optimism, a necessary trait for this group. However, since 2001, even though local economic conditions have negatively impacted on commercial and office markets overall, demand for properties around the newest rail transit stations has remained strong, as reported in our interviews.

Obviously, further research is needed. Ryan (1999) has suggested that travel time, rather than distance, is a more appropriate spatial delimiter for measuring the effect of rail transit stations on local property values. One reviewer of this paper made the excellent suggestion of interviewing residents of multifamily and single-family properties included in the study to ascertain their commuting

behavior. Funding for this expansion of our research is being sought. Finally, developing consistent methodologies could help to specify regional differences and develop hypotheses to explain the wide variation in results of studies in this area.

Are there lessons for Australia to be learned here? Like Texas and other parts of the southwestern United States, Australian metropolitan areas are struggling with transportation issues related to population growth and urban sprawl. Commuting times and distances are increasing for many workers. Rail transit systems provide one of several potential solutions to transportation challenges. The calculus of assessing the impacts of these rail transit systems should include the fiscal and economic impacts associated with property development in an around transit system stations. Extending this type of analysis to the Australian experience could provide broader understanding of the development processes involved and the market for transit-oriented development.

Based on our findings, at least for the moment, and in Texas, the presence of rail transit stations have their greatest positive influence where access is improved for people, as exhibited by office and residential sites. Even though Dallas retailers do not appear to benefit from proximity to rail stations, they are not particularly harmed. Developers, urban planners, and transit agency officials can consider this information when siting future light rail stations.

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