The (Overlooked) Link between Express Bus Stations and Commercial Rents with Implications for Transit and Land Use Planning



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OVERVIEW

This is the first study establishing the association between express bus transit (XBT) stations and commercial office, apartment and retail rents.

- Nearly all research reporting the association between transit and real estate values focuses on heavy rail (also called third rail), light rail, streetcar (also called trolley), commuter rail, and bus rapid transit. Forgotten in the research is the influence that express bus systems and their stations can also have on real estate values or rents.
- This research helps close the gap.
- We find surprisingly robust associations between XBT stations on office and apartment rents well beyond one mile, and strong associations with respect to retail rents although these are limited to locations closest to XBT stations.
- Transit and land use planning and policy implications are offered.

Express Bus Characterized

Express bus transit (XBT) features include:

- High-occupancy vehicle (HOV) busway
- Freeway HOV lanes have express bus service and stations
- Busway along abandoned railroad line
- Express buses use contra-flow bus lanes on freeway
- Peak-period freeway bus lane busway with stations along unused railroad







REAL ESTATE MARKET PREMIUMS WITH RESPECT TO TRANSIT STATION PROXIMITY

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

Model:

during 2017

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, Outlet Mall Multifamily - Senior or Student housing

U is two dimensions:

Workers per Labor Force Member Entropy as a measure of land use mix

L is two dimensions: Distance from Downtown Distance from Freeway Interchange

DB is the location of the subject property within one-eighth (0.125) mile distance bands of the nearest rail transit station outward to two miles.



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

R is the asking rent per square foot for property *i* reported by CoStar

S is the bundle of structure attributes for property *i* reported by

SES is Median Household Income for the block group from the 2016 American Community Survey (ACS)

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 more than 0.25 mile to 0.50 mile. Source: Robert Hibberd; basemap image from ESRI ArcGIS Online (see https://www.arcgis.com/home/group. html?id=702026e41f6641fb85da88efe79dc166#overview)

M is comprised of the individual metropolitan counties within which the rail transit systems operate

Metropolitan Area Express Bus Transit Systems Analyzed

| Albuquerque | Eugene | Ogden | San Jose |
|-------------|-----------------|----------------|----------------|
| Atlanta | Houston | Orlando | Seattle |
| Austin | Kansas | Phoenix | St. Louis |
| Buffalo | Little Rock | Pittsburgh | Tacoma |
| Charlotte | Miami | Portland | Tampa |
| Cincinnati | Minneapolis-St. | Reno | Tucson |
| Dallas-Fort | Paul | Sacramento | Virginia Beach |
| Worth | Nashville | Salt Lake City | Washington, DC |
| Denver | New Orleans | San Antonio | |

Variables, Data Sources, and Predicted Association with **Respect to Rent per Square Foot**

| Structure Controls | Data Source | Predicted Sign + | |
|-----------------------------|-------------|---------------------|--|
| Gross Leasable Area | CoStar | | |
| Class A Office | CoStar | + | |
| Class B Office | CoStar | + | |
| Stories | CoStar | + | |
| Effective Year Built | CoStar | + | |
| Vacancy Rate | CoStar | - | |
| Power Ćenter | CoStar | na | |
| Neighborhood | CoStar | na | |
| Community | CoStar | na | |
| Regional | CoStar | na | |
| Lifestyle | CoStar | na | |
| Outlet | CoStar | na | |
| Occupancy Control | | | |
| Senior | CoStar | na | |
| Student | CoStar | na | |
| Socioeconomic Control | | | |
| Median Household Income | Census ACS | + | |
| Land Use Mix Controls | | | |
| Workers per Labor Force | LEHD, ACS | + | |
| Entropy | LEHD | + | |
| Location Controls | | | |
| Distance Downtown Center | Computed | + | |
| Distance Freeway Ramp | Computed | +/- | |
| Distance Band | - | | |
| 1/8 mile bands to 2.0 miles | Computed | +, +/- | |

THE LINK BETWEEN XBT STATION PROXIMITY AND OFFICE, MULTIFAMILY AND RETAIL RENTS PER SQUARE FOOT

| Office Rents with Respect to | | Apartment Rents with Respect to | | Retail Rents wi | |
|--|-----------------|----------------------------------|-----------------|---------------------------------|--|
| Variables XBI Station Proximity | Office | Variables | Multifamily | Variables XBI Station | |
| Constant | 0.963 | Constant | -1.913 | Constant | |
| Structure Controls | | Structure Controls | | Structure Controls | |
| Gross Leasable Area | -1.388E-007 | Gross Leasable Area | -2.277E-008 | Gross Leasable Area | |
| Class A Office | 0.321 | Average Unit Size | -5.077E-005 | Effective Year Built | |
| Class B Office | 0.088 | Stories | 0.025 | Vacancy Rate | |
| Stories | 0.006 | Effective Year Built | 0.001 | Power Center | |
| Effective Year Built | 0.001 | Vacancy Rate | 0.003 | | |
| Vacancy Kafe | -0.001 | Occupancy Control | 0.014 | Community | |
| | na | Student | -0.165 | lifestyle | |
| | na | Sibdem | -0.109 ng | Outlet | |
| Socioeconomic Control | | Socioeconomic Control | | Socioeconomic Control | |
| Median Household Income | 1.598E-006 | Median Household Income | 2.945E-006 | Median Household Income | |
| Land Use Mix Controls | | Land Use Mix Controls | | Land Use Mix Controls | |
| Workers per Labor Force | 0.000 | Workers per Labor Force | 0.003 | Workers per Labor Force | |
| Entropy | -0.042 | Entropy | 0.066 | Entropy | |
| Location Controls | | Location Controls | | Location Controls | |
| Distance Downtown Center | -5.712E-007 | Distance Downtown Center | -3.961E-007 | Distance Downtown Center | |
| Distance Freeway Ramp | 5.913E-007 | Distance Freeway Ramp | -3.407E-006 | Distance Freeway Ramp | |
| Distance Band | | Distance Band | 0.075 | Distance Band | |
| <=0.125 mile | 0.090 | <=0.125 mile | 0.0/5 | <=0.125 mile | |
| >0.123 - <= 0.230 mile | 0.10/ | >0.123 - <= 0.230 mile | 0.092 | >0.123-<=0.230 mile | |
| >0.230-<-0.373 mile | 0.100 | >0.230 <= 0.573 mile | 0.080 | >0.230-<-0.373 mile | |
| >0.500 <= 0.500 mile | 0.095 | >0.570-<=0.500 mile | 0.082 | >0.570-<=0.500 mile | |
| >0.500-< 0.023 mile | 0.009 | >0.500-< 0.025 mile | 0.047 | >0.625-<=0.750 mile | |
| >0.750-<=0.875 mile | 0.068 | >0.750-<=0.875 mile | 0.056 | >0.750-<=0.875 mile | |
| >0.875-<=1.000 mile | 0.041 | >0.875-<=1.000 mile | 0.048 | >0.875-<=1.000 mile | |
| >1.000-<=1.125 mile | 0.038 | >1.000-<=1.125 mile | 0.063 | >1.000-<=1.125 mile | |
| >1.125-<=1.250 mile | 0.049 | >1.125-<=1.250 mile | 0.040 | >1.125-<=1.250 mile | |
| >1.250-<=1.375 mile | 0.044 | >1.250-<=1.375 mile | 0.035 | >1.250-<=1.375 mile | |
| >1.370-<=1.500 mile | 0.061 | >1.370-<=1.500 mile | 0.030 | >1.370-<=1.500 mile | |
| >1.500-<=1.625 mile | 0.012 | >1.500-<=1.625 mile | 0.031 | >1.500-<=1.625 mile | |
| >1.625-<=1.750 mile | 0.073 | >1.625-<=1.750 mile | 0.020 | >1.625-<=1.750 mile | |
| >1.750-<=1.875 mile | 0.068 | >1.750-<=1.875 mile | 0.025 | >1.750-<=1.875 mile | |
| >1.875-<=2.000 mile | 0.088 | >1.875-<=2.000 mile | 0.013 | >1.875-<=2.000 mile | |
| Metropolitan Controls | 0.000 | Metropolitan Controls | 0.015 | Metropolitan Controls | |
| Albuquerque | -0.333 | Albuquerque | -0.315 | Albuquerque | |
| Austin | -0.014 | Austin | -0.217 | Austin | |
| Buffalo | -0.333 | Buffalo | -0.030 | Buffalo | |
| Charlotte | -0.073 | Charlotte | -0.327 | Charlotte | |
| Cincinnati | -0.416 | Cincinnati | -0.449 | Cincinnati | |
| Dallas-Fort Worth | -0.108 | Dallas-Fort Worth | -0.145 | Dallas-Fort Worth | |
| Denver | 0.101 | Denver | 0.097 | Denver | |
| Eugene | -0.031 | Eugene | -0.162 | Eugene | |
| Houston | -0.058 | Houston | -0.242 | Houston | |
| Kansas | -0.255 | Kansas | -0.430 | Kansas | |
| Little Rock | -0.247 | Little Rock | -0.537 | Little Rock | |
| Miami | 0.156 | Miami | 0.059 | Miami | |
| Minneapolis-St. Paul | -0.307 | Minneapolis-St. Paul | -0.151 | Minneapolis-St. Paul | |
| Nashville | 0.012 | Nashville | -0.1/8 | Nashville | |
| Ogden | -0.324 | Ogden | -0.385 | Ogden | |
| Phoenix | -0.022 | Oriando Phoenix | -0.139 | Oriando Phoonix | |
| Pittsburgh | -0.090 | Pittsburgh | -0.231 | Pittsburgh | |
| Portland | 0.033 | Portland | -0.015 | Portland | |
| Reno | -0.121 | Reno | -0.174 | Reno | |
| Sacramento | -0.004 | Sacramento | -0.066 | Sacramento | |
| Salt Lake City | -0.181 | Salt Lake City | -0.261 | Salt Lake City | |
| San Antonio | 0.116 | San Antonio | -0.206 | San Antonio | |
| San Jose | 0.521 | San Jose | 0.391 | San Jose | |
| Seattle | 0.140 | Seattle | 0.151 | Seattle | |
| St. Louis | -0.217 | St. Louis | -0.379 | St. Louis | |
| Tacoma | -0.206 | Tacoma | -0.214 | Tacoma | |
| Tampa | -0.093 | Tampa | -0.172 | Tampa | |
| Tucson | -0.155 | Tucson | -0.345 | Tucson | |
| Virginia Beach | -0.252 | Virginia Beach | -0.241 | Virginia Beach | |
| vvasningron Model Parformance | 0.578 | vvasnington Model Porformance | 0.32/ | vvasnington | |
| | 20 V0 V | | 12 255 | | |
| R2. adjusted | 20,004 ∩ 377 | R2. adjusted | 43,355 0 125 | R2. adjusted | |
| F-ratio | 288 593 | F-ratio | 556 617 | F-ratio | |
| Selected Descriptive Statistics | _00.070 | Selected Descriptive Statistics | 000.017 | Selected Descriptive Statistics | |
| Rent Square Foot/Year | \$21.94 | Rent Square Foot/Month | \$1.39 | Rent Square Foot/Year | |
| Gross Leasable Area | 51,686 | Gross Leasable Área | 116,498 | Gross Leasable Area | |
| Median Household Income | \$64,720 | Median Household Income | \$49,854 | Median Household Income | |
| Distance Downtown Center | 53,396 | Distance Downtown Center | 47,989 | Distance Downtown Center | |
| Distance Freeway Ramp | 7,052 | Distance Freeway Ramp | 7,000 | Distance Freeway Ramp | |
| Comments: Significant (p < 0.10) non-metropolitan control variables in bo | old. | | | | |

ignificant (p < 0.10) distance band variables in bold rea Ibuquerque and Sacramento have missing CoStar retail cas





Rents with Respect to Station Proximity

2.838E-006 0.002 0.034 -4.666E-007 -2.413E-006 52,309 8.216

WITH RESPECT TO XBT STATION **DISTANCE BANDS:**

- Office rents decline gradually from the first distance band to the 1.625-mile distance band;
- Multifamily rents decline gradually from the first distance band to the 1.875-mile distance band and
- Retail rents begin with a positive premium at the first distance then fall steeply over the next two distance bands.

These empirical outcomes, based on tens of thousands of commercial properties in nearly 40 metropolitan areas, are surprising with respect to the distance over which there seems to be a rent premium with respect to office and multifamily properties being more than 1.5 miles and nearly 2.0 miles respectively.



The percent rent change from the mean between XBT station proximity and office, multifamily and retail rents per square foot

KEY FINDINGS:

- The commercial real estate market values proximity to XBT stations with office and multifamily rent premiums extending more than 1.5 miles and near 2.0 miles, respectively
- These are rent premium distances comparable to streetcars and CRT, considerably more than office with respect to LTRT, and considerably more than BRT for both real estate types.
- XBT results are perplexing because conventional wisdom assumes that since they have fewer stops between nodes than LRT, BRT and SCT, they provide access to fewer opportunities,
- XBT systems tend to operate only during peak commuting hours during weekdays.
- With few exceptions, XBT investments are modest and routes are easily changed to meet new demands, which can undermine market confidence in long term transit accessibility.
- The rent premium distances suggest that workers and multifamily residents are willing to work or live 1.5-2.0 miles from XBT stops:
- They likely do not walk those distances however, but rather using park-and-ride/ kiss-and-ride at residential stops, and feeder transit services such as conventional
- We also know anecdotally that some XBT systems include Wi-Fi and other amenities onboard which can allow for some productivity en route.
- More research is needed to explore how XBT systems can meet market needs, and facilitate economic development.