

Effect of COVID-19 on Property Value Premium of Light Rail Transit: A Case Study of the Portland Metropolitan Area

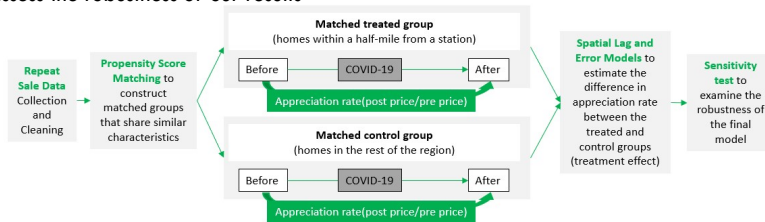
Sangwan Lee, Liming Wang, and Aaron Golub

INTRODUCTION

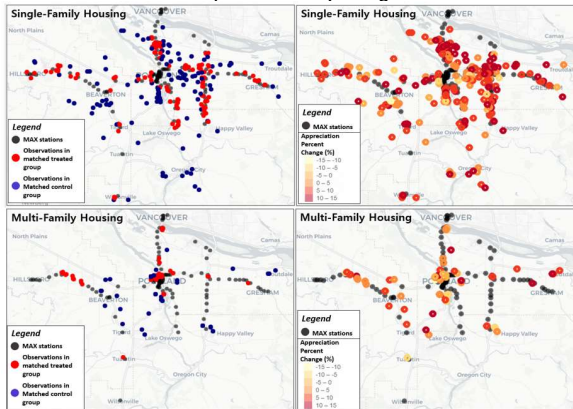
- It is well documented that the COVID-19 pandemic caused public transit ridership to plummet, and residential location preferences shift toward less-populated areas.
- However, it is unknown how the well-established premium for living in neighborhoods with better transit accessibility changed during the intermediate period of the pandemic.
- This research investigates how the residential property price premium for proximity to LRT was affected by the COVID-19 pandemic in the intermediate term with a case study of the Portland, OR area.
- This research helps improve our understanding of the economic impact of COVID-19 and inform discussions about possible changes in the post-COVID cities and their planning.

RESEARCH DESIGN

- A four-step process: (1) collect and clean home sales data, (2) employ Propensity Score Matching to find matching pairs of treated and control properties, (3) use Spatial Lag and Error Models to estimate the effect, and (4) conduct sensitivity tests to assess the robustness of our results



- Observations in the Portland Metropolitan Area, Oregon



RESULTS

1. The results of propensity score matching

Covariates	Single-Family Housing		Multi-Family Housing	
	Standardized difference	P-value of Paired t-test	Standardized difference	P-value of Paired t-test
Bldg_area	0.053	0.649	0.131	0.584
Lot_area	0.013	0.911	0.032	0.899
Age	0.129	0.265	0.033	0.847
Dist_Fwy	0.005	0.961	0.178	0.481
Dist_Ramp	0.042	0.653	0.033	0.883
Dist_SR	0.107	0.302	0.040	0.865
Dist_Bus	0.047	0.764	0.078	0.796
Dist_CBD	0.106	0.316	0.041	0.856
Pop_Den	0.057	0.605	0.020	0.856
White	0.170	0.155	0.025	0.917
HH_income	0.040	0.720	0.174	0.298
Emp_rate	0.116	0.392	0.076	0.686
Land_Mix	0.029	0.817	0.014	0.946
Net_Den	0.048	0.629	0.013	0.944
Inter_Den	0.001	0.992	0.030	0.823
Schools	0.116	0.283	0.132	0.670
Access_auto	0.088	0.387	0.076	0.762
Access_transit	0.069	0.502	0.049	0.811

Sample size		
Treated group	124	44
Control group	124	44

3.1. Summary of sensitivity tests (Single-Family Housing)

	Appreciation Rate Cut-Offs				
	±10%	±15%	±25%	±55%	No cut-offs
Single-Family housing					
Spatial Lag Model	0.017	0.021	0.015	0.018	0.004
Treatment Effect					
P-Value	0.009	<0.001	0.008	0.049	0.803
Sample size	158	248	420	622	690
Spatial Error Model	0.017	0.017	0.013	0.019	0.006
Treatment Effect					
P-Value	0.010	0.006	0.076	0.028	0.703
Sample size	158	248	420	622	690

2. The result of the spatial Lag and error Models

	Single-Family Housing		Multi-Family Housing	
	Spatial Lag Model <Model 1>	Spatial Error Model <Model 2>	Spatial Lag Model <Model 3>	Spatial Error Model <Model 4>
Total impact (Std. error)	0.021** (0.010)	0.017** (0.011)	-0.028** (0.011)	-0.032** (0.012)
Treated	0.021*** (0.006)	0.017** (0.006)	-0.028** (0.014)	-0.032** (0.014)
Length of time	<0.001*** (<0.001)	<0.001*** (<0.001)	<0.001 (<0.001)	<0.001 (<0.001)
Model statistics				
Observations	248	248	88	88
Rho	-0.002	0.029**	0.017	0.041***
Lambda				0.004
Sigma squared	0.002	0.002	0.004	0.004
LR test with a-spatial model	0.118	3.670	0.274	8.923
Wald Statistics	0.105	7.110***	0.828	48.933***
Log-likelihood	401.624	403.400	114.591	118.915
AIC	-793.248	-796.800	-219.180	-227.830
AIC for a-spatial model	-795.130	-795.130	-220.910	-220.910

Notes:

- Dependent variable: log-transformed appreciation rate
- Treated: 1 if the property is located within a half-mile from an LRT station
- Length of time: length of time between two transactions in days
- * Significant at p < 0.10; ** Significant at p < 0.05; *** Significant at p < 0.001

3.2. Summary of sensitivity tests (Multi-Family Housing)

	Appreciation Rate Cut-Offs				
	±10%	±15%	±25%	±55%	No cut-offs
Multi-family housing					
Spatial Lag Model	-0.018	-0.028	-0.036	-0.015	-0.021
Treatment Effect					
P-Value	0.150	0.048	0.032	0.499	0.462
Sample size	72	88	116	142	158
Spatial Error Model	-0.019	-0.032	-0.053	-0.023	-0.036
Treatment Effect					
P-Value	0.129	0.022	0.001	0.239	0.181
Sample size	72	88	116	142	158

SUMMARY AND DISCUSSION

Single-Family Housing Market

- Key Finding:** The price appreciation rate was 1.7% higher for single-family homes located within a half-mile of an LRT station in the Portland metropolitan area, Oregon, compared to otherwise similar homes.
- Discussions:**
 - The short-term change in transit ridership has not translated to transit proximity losing its appeal in the single-family housing market.
 - The impact of the pandemic became "decoupled" from the transit utility in some ways, as actual ridership significantly declined while the property premiums increased.

Multi-Family Housing Market

- Key Finding:** Conversely, multi-family homes within an LRT service area showed a 3.2% lower price appreciation rate than those with similar characteristics outside LRT service area.
- Discussions:**
 - Demand for multi-family housing within LRT service area is sensitive to proximity to amenities and services.
 - Multi-family homes near transit stations may be considered less favorable as they generally are in areas of higher density that may lead to a higher probability of spreading the virus.

ACKNOWLEDGEMENT

- This project was funded by the National Institute for Transportation and Communities (NITC; grant number 1433), a U.S. DOT University Transportation Center.