PSU Student Research from the TRB 2022 Annual Meeting: Effect of COVID-19 on Property Value Premium of Light Rail Transit

Sangwan Lee
Portland State University, sangwan@pdx.edu

Follow this and additional works at: https://pdxscholar.library.pdx.edu/trec_seminar

Recommended Citation
https://pdxscholar.library.pdx.edu/trec_seminar/217

Let us know how access to this document benefits you.
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
Nohad A. Toulan School of Urban Studies & Planning
Portland State University
1. Introduction

- View
- Condition
- Distance to Downtown
- Number of Beds
- The accessibility to Amenities
- Neighborhoods
- Nearby School quality
- Proximity to Transit Station (Property Value Premium of Transit)
- The premium can change over time
- Transform long-standing price mechanism?
- This Research

Image Source:
https://www.dreamstime.com/basic-rgb-image145730565
https://www.youtube.com/watch?v=KckUy7xqyxw
3. Research Design

1) The overview
   - We attempted to quantify the COVID-19 impact on the residential property value premium of light rail transit in the Portland Metropolitan area (the treatment effect in this paper).
   - We employed a longitudinal quasi-experimental design following a four-step process.

2) Timeline of the case study
   - We identified two time periods for our case study. Specific periods of the Portland case study are as follows:
     - The pre-COVID period (before the COVID-19 outbreak): January 2016 ~ February 2020
     - The peri-COVID period (during the COVID-19 outbreak): March 2020 ~ May 2021
3. Research Design

3) Study Area

- The regional transportation agency, the Tri-County Metropolitan Transportation District of Oregon (TriMet), operates the region's light rail system, MAX. By 2015, the system has expanded to 5 colored-designated lines.

- The broad trend in transit ridership and residential property values

![Graph showing estimated weekly boarding of light rail transit in the Portland metropolitan area](source: Trimet, Portland)

![Graph showing the monthly Case-Shiller Home Price Index of the Portland metropolitan area](source: S&P Dow Jones Indices LLC)
3. Research Design

4) Repeat Sales Data
- We analyzed repeat sales of single-family and multi-family housing collected from the Regional Land Information System.
- All repeat sales included one in the pre-COVID period and one in the peri-COVID period.
- We removed transaction records whose price change between the two periods was lower than -15% or higher than 15%.

5) Methodological approach
- Propensity Score Matching (PSM)
  - We used PSM method to construct matched pairs of treated and control properties with similar observed characteristics and overcome non-random assignment in observational studies.
  - The 17 covariates used to estimate the propensity scores included structural characteristics (e.g., lot size), locational factors (e.g., distance to Central Business District), and neighborhood characteristics (e.g., median household income).
  - We used homes within a half-mile from the nearest light rail station, as observations in the pool of treated group.
  - Homes outside a half-mile buffer were in the pool of control group.
- Spatial Econometrics
  - After finding appropriate pairs of treated and control homes, we developed Spatial Lag and Error Model to account for the spatial autocorrelation (Anselin 2003; 2013).
  - The dependent variable was the log-transformed appreciation rate of the residential property.
  - Our focus of the model was on the parameter estimate of a dummy variable of whether an observation is in the matched treated group, which we called the treatment effect.
  - We also controlled the length of time between two transactions to address the challenges of seasonality.
4. Results

1) Balance Diagnostics of Propensity Score Matching (PSM)

The standardized mean difference between the two matched groups

The p-value of paired t-test between the two matched groups
4. Results

2) The Matched Observations

The location of matched observations

The appreciation percent change of matched observations
4. Results

3) Spatial Econometrics and sensitivity test
   - Single-family housing

The treatment effects of the spatial econometrics and sensitivity tests for different cut-offs.
4. Results

3) Spatial Econometrics and sensitivity test

- Multi-family housing
5. Discussion and Conclusion

1) Concluding remarks

- The COVID-19 pandemic has crushed transit ridership and reportedly changed residential location preferences toward less-populated areas.

- Whether these changes have affected the preference for neighborhoods with better transit accessibility so far through the pandemic is a research question that has not been investigated.

- We filled this gap by examining whether property value premium for proximity to light rail stations in the Portland Metropolitan area remained during the pandemic.

2) Discussion

- Discussion on the findings of the single-family housing market

- Discussion on the findings of the multi-family housing market

3) Limitation

- Two common home attributes, including number of bedrooms and bathrooms, are not provided by our data source

- Our models did not include all factors homebuyers’ value when on the housing market, for example, school quality and some amenities.

- This paper did not consider all dramatic change due to COVID, such as temporary closed amenities.

- We don’t know how generalizable our results from the Portland area are to other regions in the U.S., let alone across the globe.

- The research may seem to be immature to have long-term effect of COVID on the real estate market.

Acknowledgement

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