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

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EFFECT OF COVID-19 ON PROPERTY VALUE PREMIUM OF LIGHT RAIL TRANSIT: A CASE STUDY OF THE PORTLAND METROPOLITAN AREA

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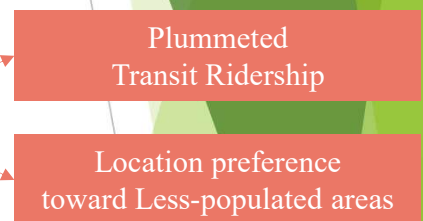
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1. Introduction

View

Condition

Distance to Downtown

Neighborhoods

Number of Beds

Nearby School quality

The accessibility to Amenities

Proximity to Transit Station (Property Value Premium of Transit)

COVID-19

Plummeted Transit Ridership

Location preference toward Less-populated areas

The premium can change over time

Transform long-standing price mechanism?

This Research

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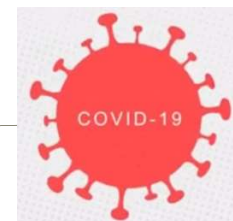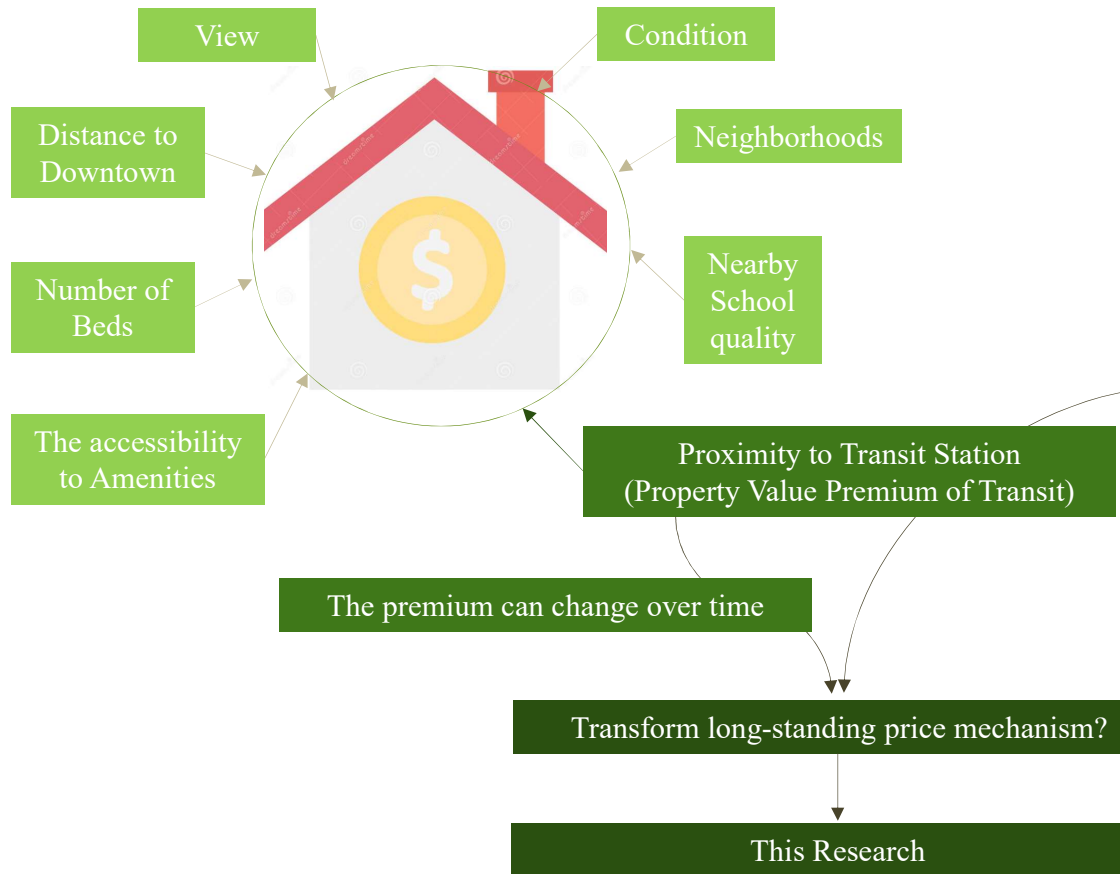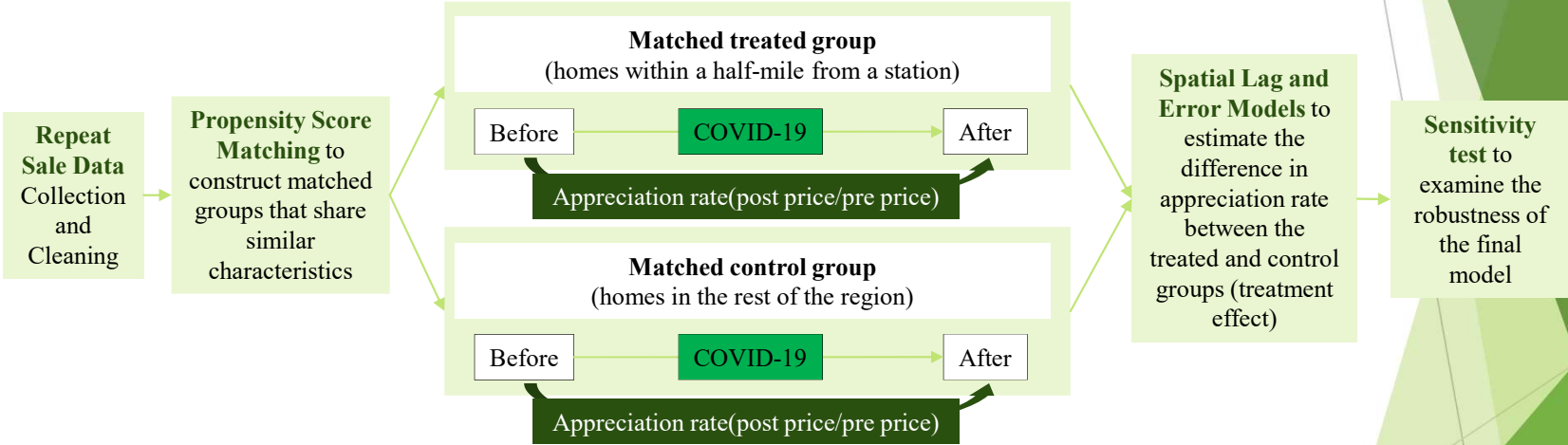https://www.youtube.com/watch?v=KckUy7xqyxw

3. Research Design

1) The overview

- o 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).

- o We employed a longitudinal quasi-experimental design following a four-step process.

2) Timeline of the case study

- o 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
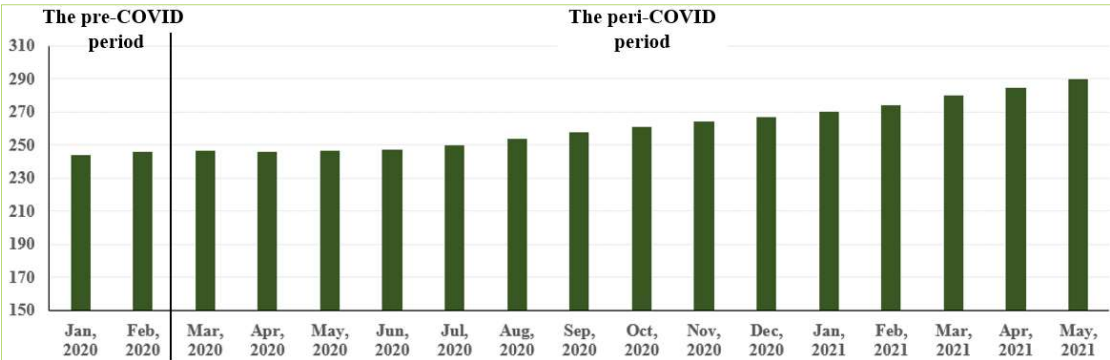
3. Research Design

3) Study Area

- o   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.

- o   **The broad trend in transit ridership and residential property values**
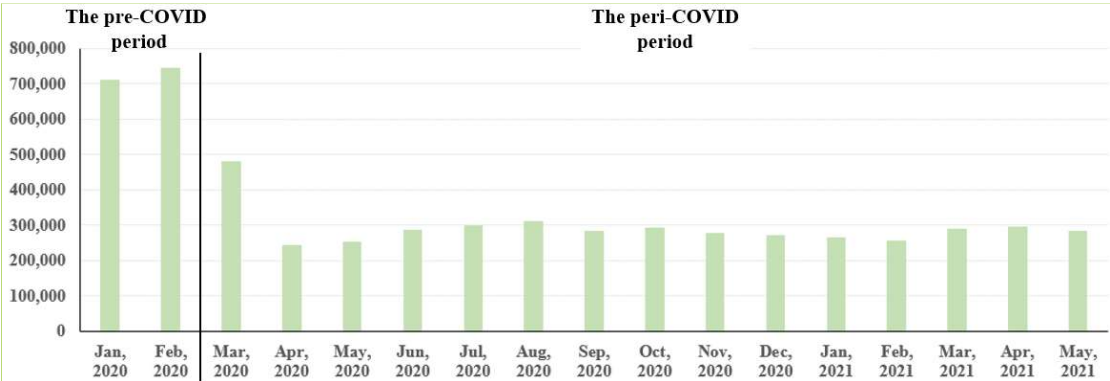
Estimated weekly boarding of light rail transit in the Portland metropolitan area (Source: Trimet, Portland)

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

- o   We analyzed repeat sales of single-family and multi-family housing collected from the Regional Land Information System.

- o   All repeat sales included one in the pre-COVID period and one in the peri-COVID period.

- o   We removed transaction records whose price change between the two periods was lower than -15% or higher than 15%.

5) Methodological approach

- o   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.

- o   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

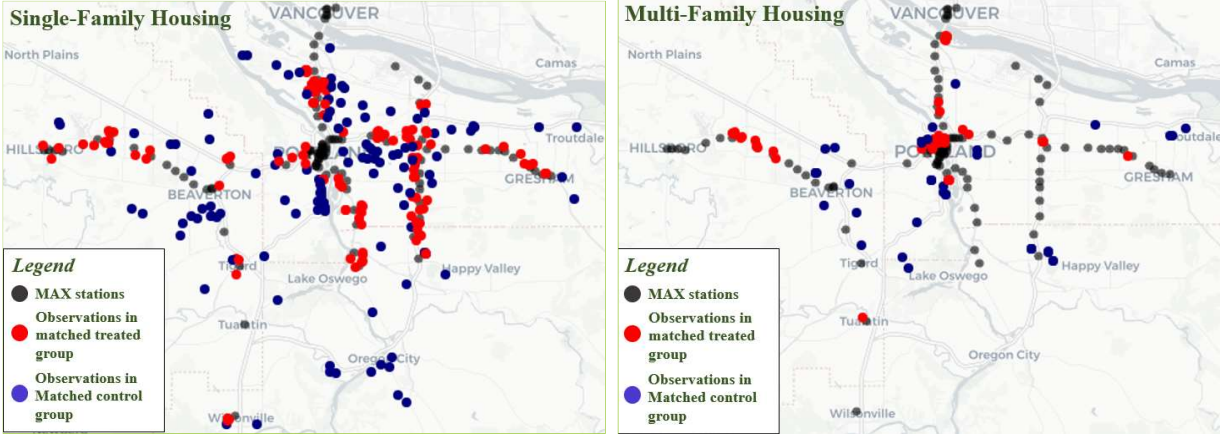## 1) Balance Diagnostics of Propensity Score Matching (PSM)
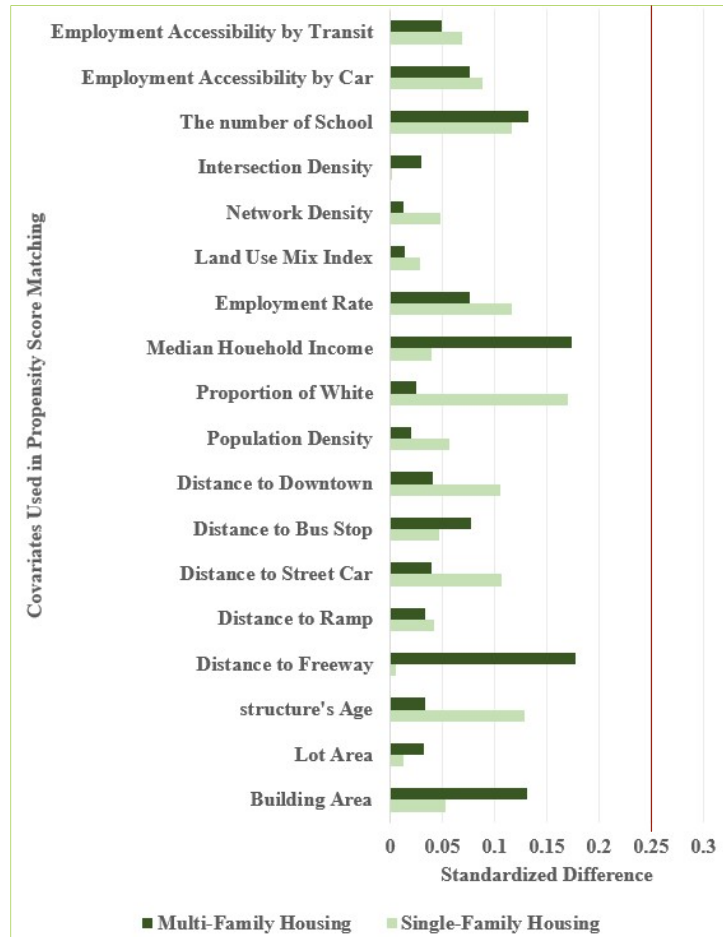
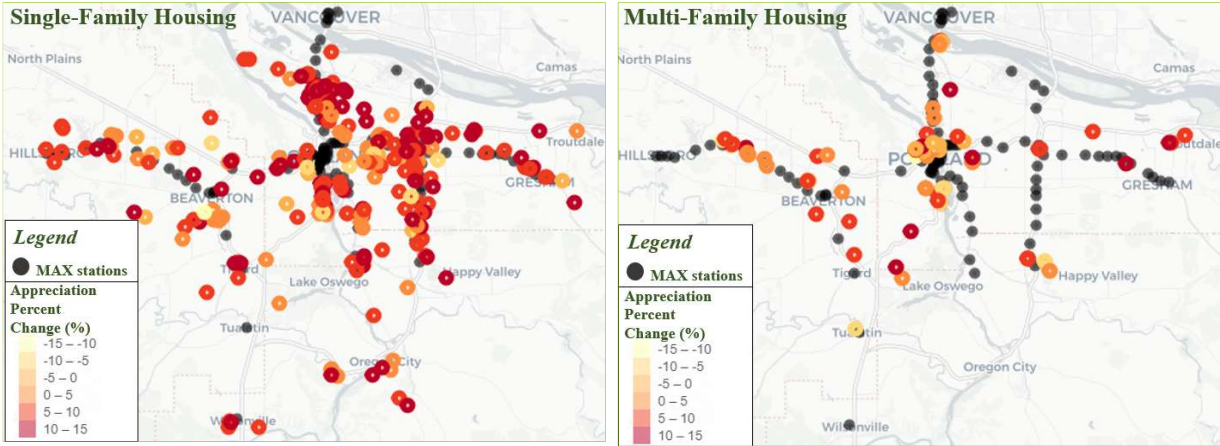The standardized mean difference between the two matched groups
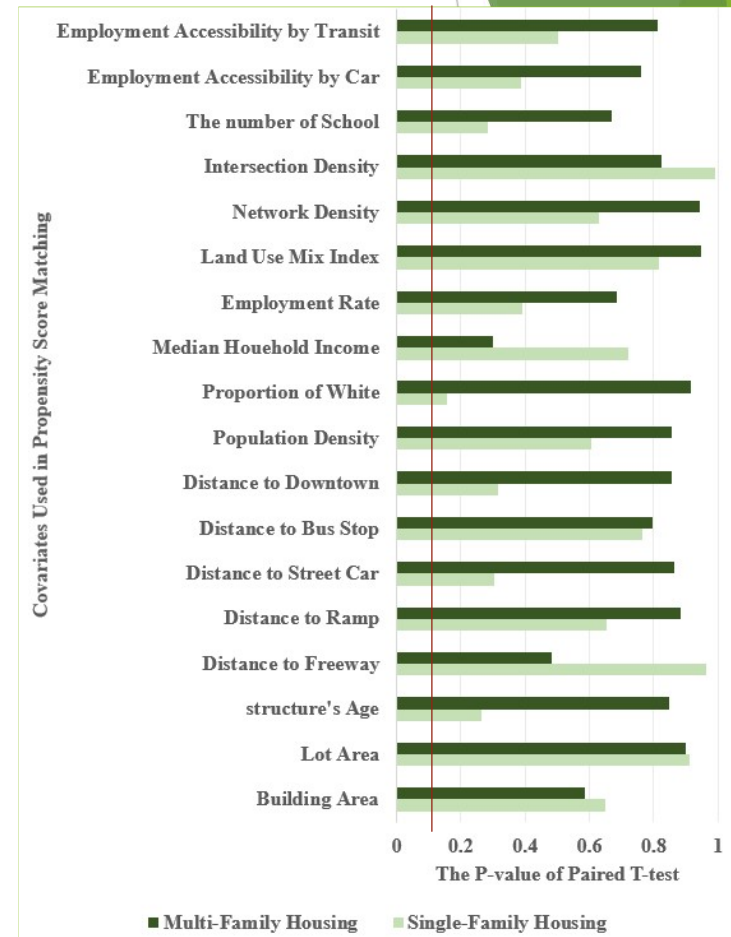
The p-value of paired t-test between the two matched groups

4. Results

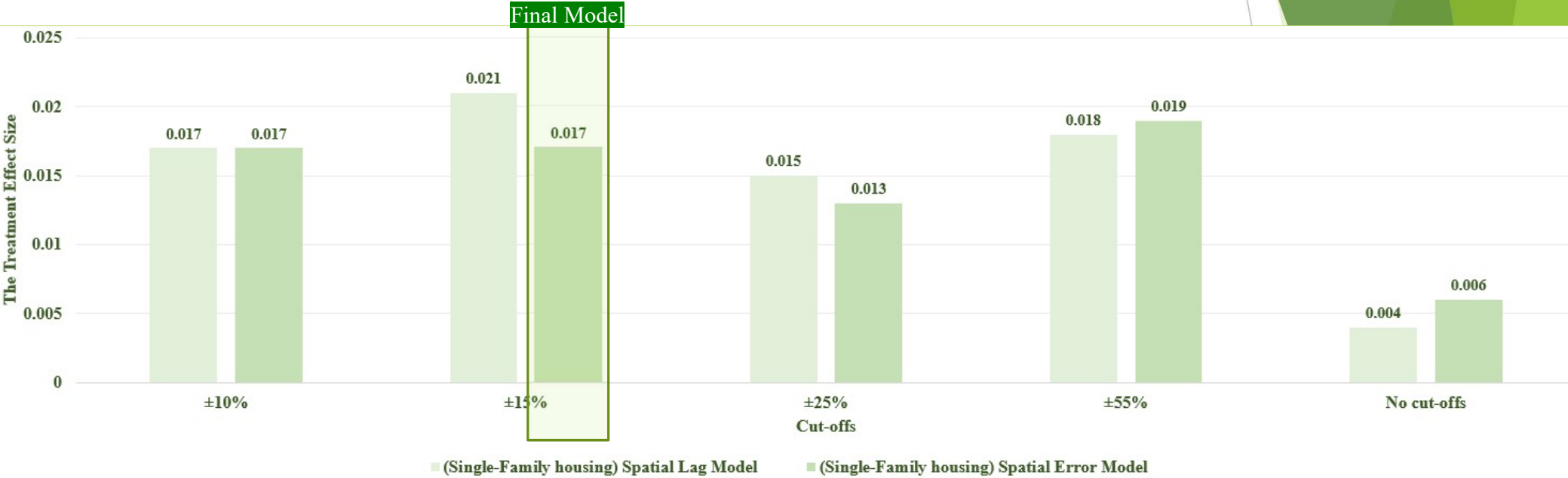### 2) The Matched Observations

The location of matched observations

The appreciation percent change of matched observations

4. Results

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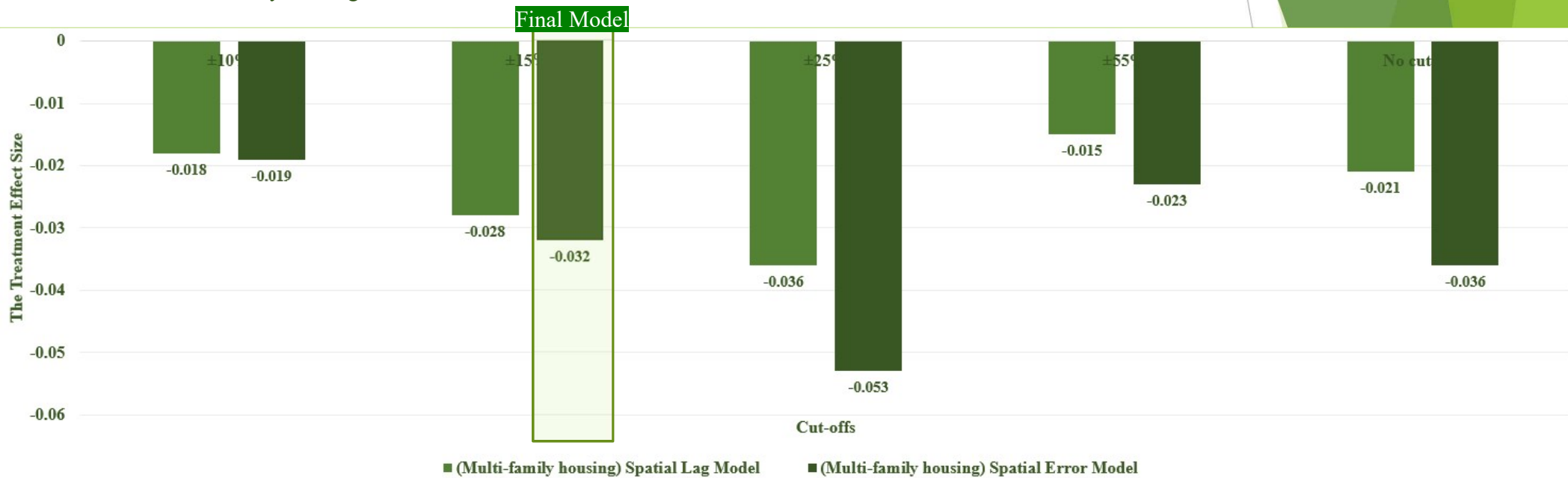
    o   Single-family housing

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

4. Results

3) Spatial Econometrics and sensitivity test

- o Multi-family housing

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

5. Discussion and Conclusion

1) Concluding remarks

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

- o   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.

- o   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

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

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

3) Limitation

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

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

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

- o   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.

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

Acknowledgement

THANK YOU!