

LOCATION, LOCATION, LOCATION :

Analysis of Monthly Rental Premiums in the Greater Cambridge Area

INTRODUCTION

The cost of accommodations reflect a willingness to pay for amenities not directly in the marketplace. Proximity to transit is one such amenity.

This project represents a collaboration with the Cambridge Development Department (CDD) with the aim of quantifying the premium associated with living within a walkable distance of a Massachusetts Bay Transport Association (MBTA) train station stop in Somerville, Cambridge and the adjacent Boston neighborhood of Allston.

Proximity to rail transit does not alone explain the cost premium of living in one of these areas. In order to capture this, associated calculations were done to determine the current premium connected to a Cambridge address, all other factors held constant.

METHODS

What is a Walkshed?

While it is easy to determine the half-mile area around a station “as the crow flies,” the resulting circular areas would not accurately represent how a pedestrian experiences the city. A walkshed is a more realistic measurement of how far is “walkable,” taking into consideration barriers like highways and rivers.

Gathering Data

Using a Python script, the rental data for this project was collected on November 5th and 30th, 2015 from Paddmapper.com, a site that aggregates apartment listings. Each property was then geocoded using latitude and longitude coordinates and—in addition to information on rent and number of bedrooms—was encoded with the following attributes based on spatial location:

- Whether the apartment was in a MBTA train station walkshed or not.
- Closest MBTA rail station.
- Whether the apartment was in Cambridge, Somerville, Allston or not.
- Population information from the American Community Survey (ACS).

Models of Analysis

The station-level means at each MBTA station stop was calculated as:

$$Rent = \alpha_0 + \alpha_1 Bedroom + \alpha_2 Walkshed$$

Where the sample was restricted for the condition of the station under analysis. *Walkshed* indicates whether an apartment is within the half-mile walkshed, and *Bedrooms* is the number of bedrooms (treated categorically).

The rent premium for each station was determined by dividing the mean rent within the ½ mile walkshed by the mean rent for all apartments closest to the station under analysis not within the ½ mile walkshed.

Average rent premium for living in Cambridge was calculated as:

$$Rent = \alpha_0 + \alpha_1 Bedroom + \alpha_2 Walkshed + \alpha_3 Cambridge$$

Where *Cambridge* indicates whether an apartment is in Cambridge or Allston-Somerville. The ACS variables were not consistently significant predictors of rent and were thus excluded from the final regression models. Alpha level was set at 5%, all results were analyzed using Stata 14.0.

RESULTS

This process found 7 stations with a significant and positive difference in station-level mean rent when within the walkshed, all other variables held constant. 3 of these — Central (p=.02), Harvard (p<.0001), and Kendall/MIT (p<.0001) — were in Cambridge. The full results for all tested stations and their rental premiums are included in Table 1.

On the average, rent per apartment was \$502.80 more in Cambridge than Somerville or Allston with all other factors held constant (p<.0001). 65% percent in variance in rent between these areas can be explained by this model (R²=.647). Indicating that while location, number of bedrooms, and proximity to transit are correlated with rental premiums there are other yet unexplored variables. See Graph and Figure 1 for further details.

FIGURE 1: How much extra do you pay to ...

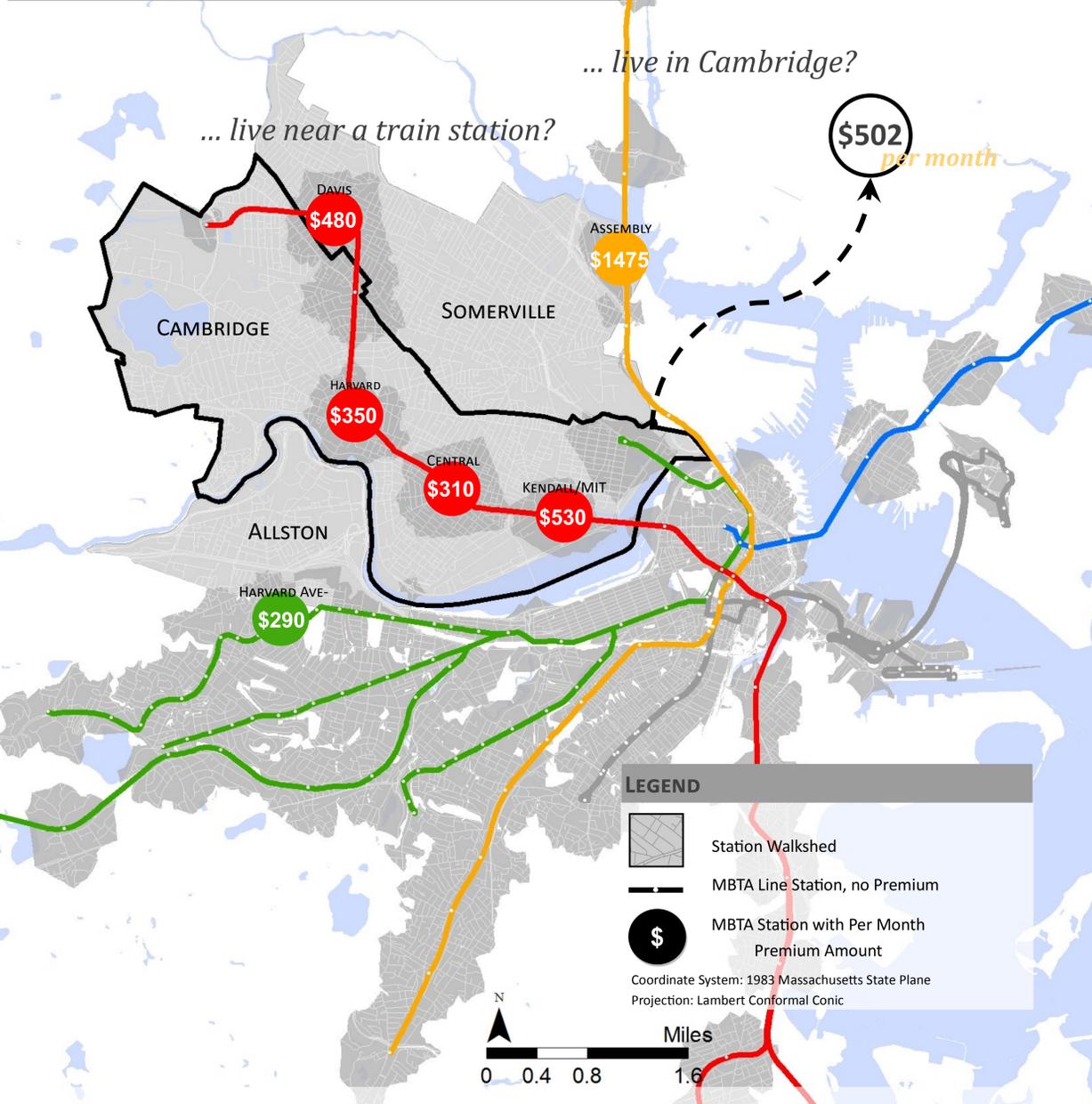
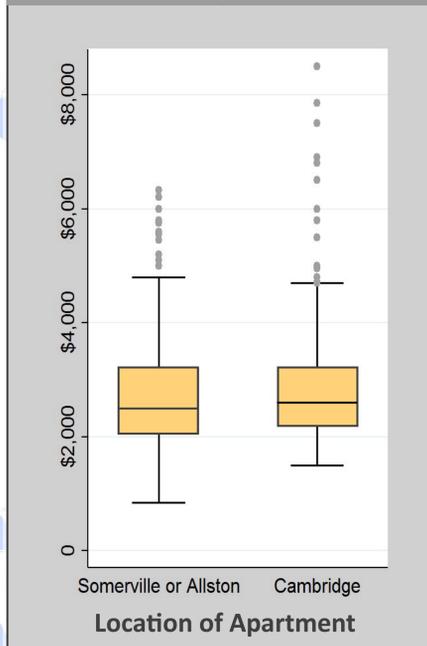


TABLE 1: MBTA Station Stops with Significant In-Walkshed Premiums

MBTA Station	Mean Rent out Walkshed β (SE)	Mean Premium in Walkshed β (SE)	95% CI	Mean Total Rent, Best Estimate	Premium Ratio*
Allston Street	\$1,701.51 (101.39)	-\$242.14 (77.76)	-396 to -88	\$1,459.37	0.86
Assembly	\$1,400.00 (324.13)	\$1,475.00 (458.39)	537 to 2413	\$2,875.00	2.05
Central	\$1,354.35 (148.12)	\$311.94 (62.72)	188 to 436	\$1,666.30	1.23
Community College	\$2,100.00 (73.48)	\$525.00 (137.48)	172 to 878	\$2,625.00	1.25
Davis	\$1,562.53 (351.14)	\$479.14 (114.03)	253 to 705	\$2,041.67	1.31
Harvard	\$1,442.61 (317.86)	\$346.74 (152.40)	43 to 650	\$1,789.35	1.24
Harvard Avenue	\$1,079.59 (134.55)	\$291.71 (63.93)	166 to 418	\$1,371.30	1.27
Kendall/MIT	\$2,084.95 (281.57)	\$530.10 (167.03)	194 to 866	\$2,615.05	1.25

α <.05 *Premium Ratio is calculated as mean rent inside walkshed divided by mean rent outside.

GRAPH 1: Cambridge Premium



CONCLUSION

The available rental data was a limitation to this analysis. Many of the 4289 apartments included in the final investigation were clustered in certain areas. 43 MBTA stations were excluded from inquiry due to having less than 5 apartments in their walksheds. That only 8 stations ultimately had significant premiums could be the result of this data sparsity. Further research with a more robust dataset is needed.

A street network which better reflected pedestrian right-of-way would likewise be recommended if this study continues.

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