How can tenants in Boston make informed, market-driven decisions?

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ABSTRACT

In Boston, 60% of people are renters, with large turnover owing to the student population. Existing online consumer-oriented sites tabulate average rent prices only by neighborhood and number of bedrooms. We analyzed the data on metro Boston's rental market to determine the most significant remaining predictors of rental cost. A Poisson regression revealed that renters pay 46% more on properties built in 2000 and after, and 26% more per additional bathroom. A site that takes these into consideration would help consumers to know the market rate more precisely. Further, we sought to understand the sharp increases in rental prices that tenants have experienced in recent years. Boston neighborhoods formed clear clusters of rental cost trends and these mapped to well-defined geographic areas, with South Boston outpacing North Boston in the percentage rate increase of rental costs. Time series analysis of rental price alone revealed similar autoregressive models for each neighborhood with high first-order correlations explaining the data.

DATA SOURCES

- ***US Census Bureau***: American Housing Survey (AHS) 2015 microdata: Boston Metropolitan Statistical Area (MSA)
- ***City of Boston***: Tax Assessor Database
- ***Zillow***: Zillow Home Value Index Comparisons: Rental Indices

CONCLUSIONS

- Year built and number of bathrooms have a large influence on rental prices; online rental price tables could be expanded
- Price differences across neighborhoods are reduced when controlling for year built, central air, and other features
- Boston neighborhoods exhibit strongly clustered rental trends
- Predicting future prices from time series analysis alone is challenging

NEXT STEPS

- Obtain data from Boston rental agencies directly
- Take floor number into account (census data is lacking)
- Receive permission for needed number of API requests from Zillow and use their live rental data
- Incorporate other features to make better predictions for rent prices over time

IS MY POTENTIAL LANDLORD RIPPING ME OFF?

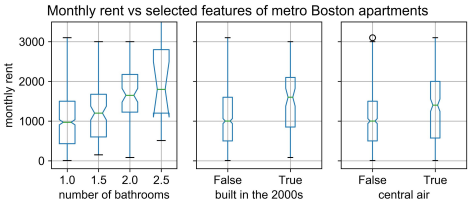
Traditional Approach

	1 br	2 br	3 br	4 br
Allston	1750	2250	2700	3300
Chinatown	2890	3870	4870	6200

Source: Zillow, Boston Pads

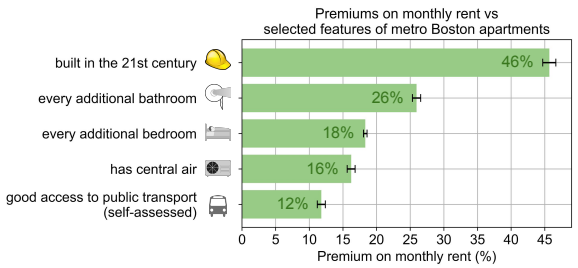
Examination of Additional Features

- Selected for rental properties in Boston Metro Statistical Area



Source: AHS 2015, *n* = 840

Poisson Regression Results



Source: AHS 2015, *n* = 840

- Error bars: 95% confidence interval from Poisson regression (bootstrapping gives same results to 3 d.p.)

Improved Rent Tables

		Allston				Chinatown			
		1 br	2 br	3 br	4 br	1 br	2 br	3 br	4 br
	Average	1750	2250	2700	3300	2890	3870	4870	6200
Before 2000	1 ba	1590	2040	2450	2990	2010	2700	3390	4320
	2 ba	-	2570	3090	3770	-	3400	4270	5440
2000 & after	1 ba	2310	2970	3570	4360	2930	3930	4940	6290
	2 ba	-	3750	4490	5490	-	4950	6220	7920

Figures assume **no** central air
29% central air | 4% 2000 & after | 1.2 baths

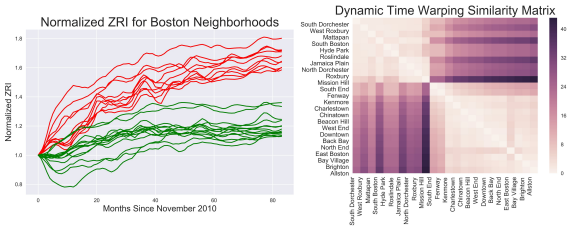
Figures assume central air
95% central air | 44% 2000 & after | 1.7 baths

Less expensive per room — More expensive per room

WHAT ARE LONG-TERM TRENDS IN RENTAL PRICES?

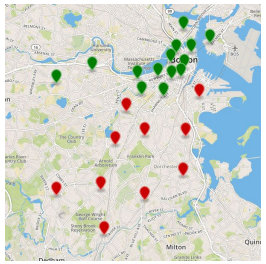
Normalized Zillow Rental Index for Boston Neighborhoods

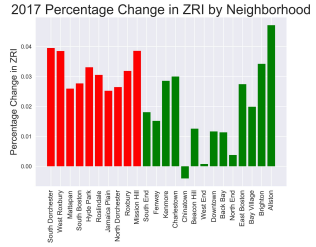
- *k*-means clustering with highest silhouette score (0.71) for $k = 2$
- Similarity matrix calculated using dynamic time warping algorithm



Properties of Observed ZRI Time Series Clusters

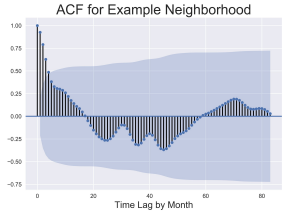
- Geographic mapping of clusters reveals sharp North / South dichotomy in normalized rental cost trends
- Projected rental increase for 2018 rent based on change in ZRI over past year

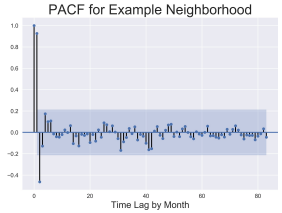




Individual Neighborhood Time Series

- Autocorrelation and partial autocorrelation functions reveal that ZRI time series resemble low-order autoregressive models with high first-order correlations





GitHub: http://bit.ly/bostonrent