

DH@Y & MDST

Fairfield/CT and Education Spending

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Background

- Fairfield, CT
- Grand List: What is it?
- PPE: Per Pupil Expenditure (spent on education)
- Task
 - (1) Who are Fairfield's peer municipalities?
 - (2) What factors are associated with PPE?
 - (3) How does Fairfield's education spending compare with its peer municipalities & how does it compare to what is predicted?
 - (4) How hearty is Fairfield's real estate market? What can Fairfield do to strengthen it?

0 Data Collection

- Factors were hand-collected from various current datasets and, when possible, from 5-10 years prior, and the % change between them (denoted with a *)
 - Mean Age
 - Mill Rate
 - Grand List Value*, Per Household*
 - Median Home Value*
 - 11th-12th Grade College Readiness
 - College Entrance Percentage*
 - Public Safety Budget, Per Capita
 - PPE*
 - Population Density
 - Population*
 - 45 factors total

1 Peer Towns

I. Filtered

Focused on (1) CT towns (Long Island/Suffolk Co would've been neat to compare though) that had (2) a population over 10,000, an (3) above-CT-median income, a (4) land mass over 10 square miles, an (5) above-20th-percentile population density within towns remaining, and (6) weren't Lyme, CT

II. Clustered

Performed semi-supervised clustering on the 34 filtered towns; a k-means cluster with $k=2$ yielded a cluster of 14 that included all 5 of the provided comparable towns; Label propagation algorithm

III. Results

Original 5: Fairfield, Greenwich, Ridgefield, Trumbull, and Westport

Added 9: Avon, Brookfield, Darien, Farmington, Glastonbury, Monroe, New Canaan, Weston, Wilton

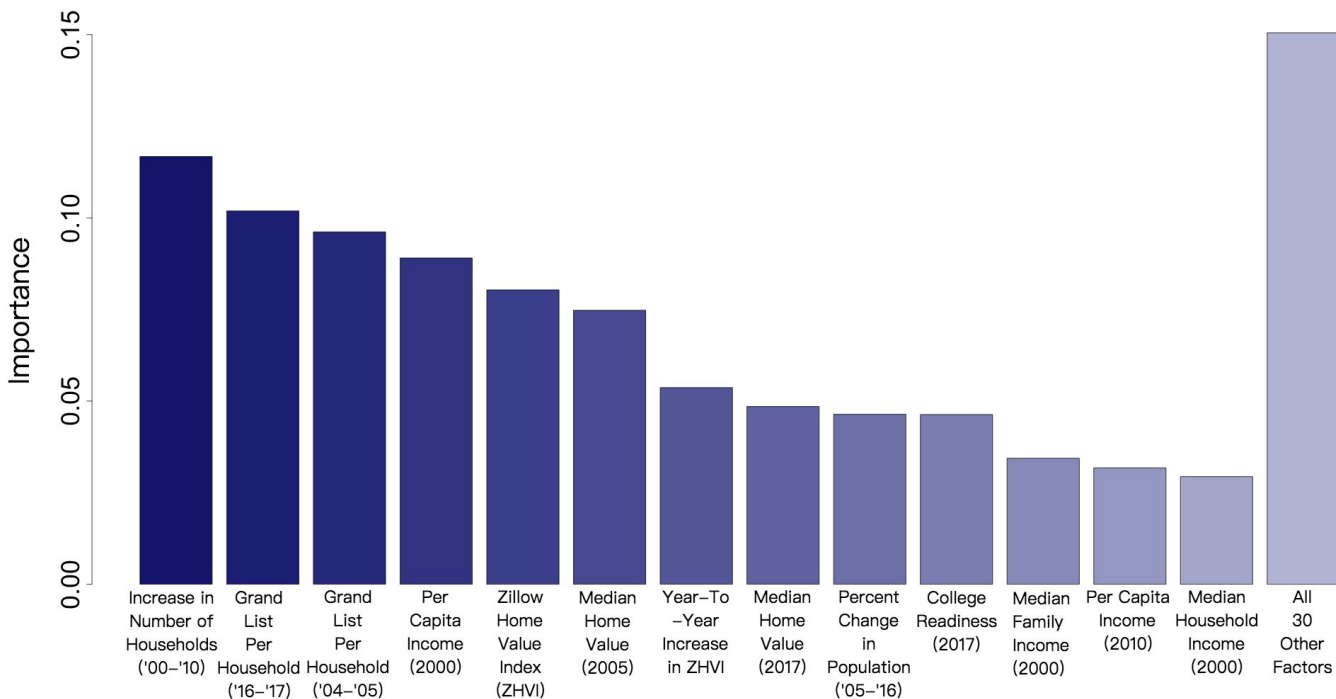
2 Factors Associated With PPE

Linear covariance:

- I. *Positive*: Income
Median family income @ .68, median household income @ .66, median per capita income @ .63
- II. *Negative*: Taxes, Lack of Income, County
Mill rate @ -.7, rank of all CT towns in per capita income @ -.51, not being in Fairfield County @ -.44
- III. *Neutral aka not*: Town Size, Density
Population @ -.014, number of households @ -0.042, square miles @ -0.054

2 Factors Associated With PPE

PPE Random Forest Regression Model – Feature Importances



3 Fairfield and PPE

- Random forest model predicted Fairfield would have a PPE of \$17,802
- LASSO model predicted Fairfield would have a PPE of \$17,739
- Fairfield's actual PPE in 2015 was \$17,063
 - Around \$700 less than what was predicted, which could be interpreted to mean Fairfield is underfunding their pupils or potentially that their education system is efficient
 - But, regardless, the mean PPE for the group is \$18,231, higher than the actual and predicted Fairfield values

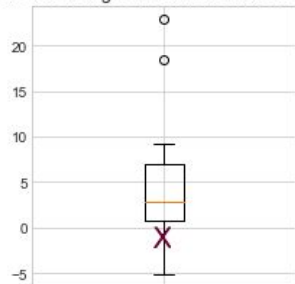
Fairfield had the 5th of 14 highest PPE in 2005 and fell to 8th by 2015 from increasing PPE spending the least amongst all 14 towns (percentage-wise, 26% to a mean of 47% and raw, \$3,487 to a mean of \$5,689)

Fairfield's college entrance % fell from 11th to 13th within the peer group from 2006 to 2013 and it is 9th and below-average in college readiness as of 2016

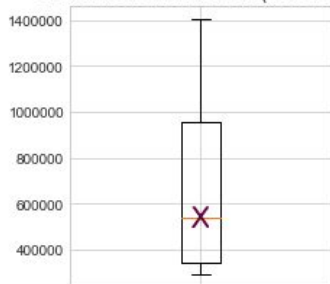
4 Fairfield, PPE, and Real Estate Markets

Fairfield's (X) performance across the top 10 factors in predicting PPE which happen to be mostly real estate value-related:

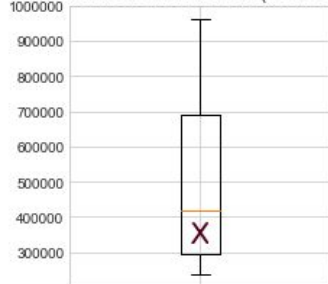
Percent Change of Number of Households



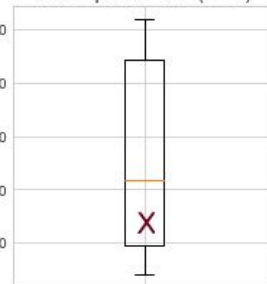
Grand List Per Household (2016-2017)



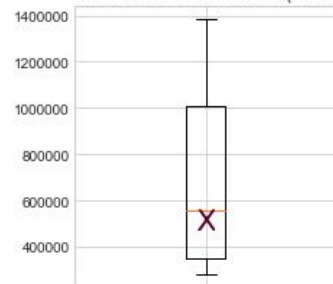
Grand List Per Household (2004-2005)



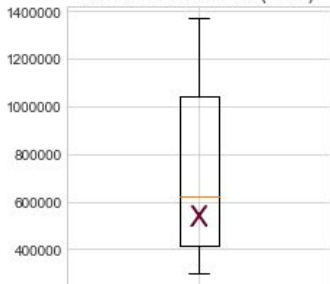
Per Capita Income (2000)



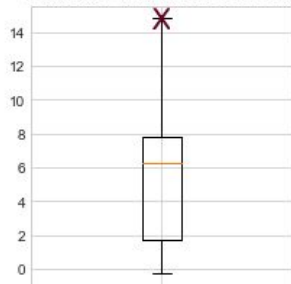
Zillow Home Value Index (ZHVI)



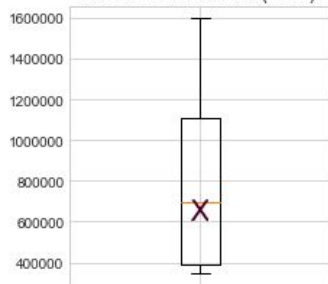
Median Home Value (2005)



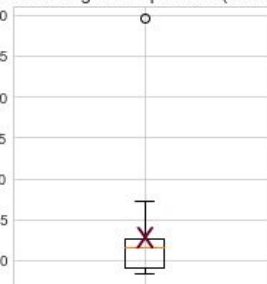
Year-Over-Year Increase in ZHVI



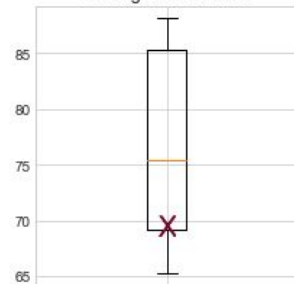
Median Home Value (2017)



Percent Change in Population (2005-2016)



College Readiness



4 Fairfield, PPE, and Real Estate Markets

- We built an xgboost model to predict our pick at a good real estate metric to measure, percentage change in grand list value between 2004 and 2016
- After dropping all real estate-related factors, Fairfield was predicted an increase of 58.2% and saw only 51.2%
- We increased factors by 2% intervals to see what is required to get the predicted grand list % to increase:
 - A 10% increase to college entrance % of Fairfield students: 58.2% → 60.0%
 - A 20% increase to public safety expenditure: 58.2% → 62.5%
 - Changing most individual factors while holding demographic statistics constant did not result in a change in grand list % increase

Limitations / Extensions

- Data collection was extremely difficult and time-consuming; lack of sufficient, good data was definitely a concern especially in model building
- Finding more comparable municipalities outside of Connecticut would help the sample component of the data shortage
- Suffolk Co, Long Island, NY has a similar proximity to NYC and socioeconomic status, making it an interesting region to compare to next
- Given more time or more centralized data, compare more town budget expenditure increases (public works, human services, etc.) and their different effectiveness in affecting grand list increase %
- Due to time constraints, clustering was done on a relatively small set of primarily-demographic features, so re-clustering with more features would be interesting

Thank you for your time!

And also food

We'll now be taking questions

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