Analysis of San Francisco Housing Market

Methods and tools to act against displacement and gentrification

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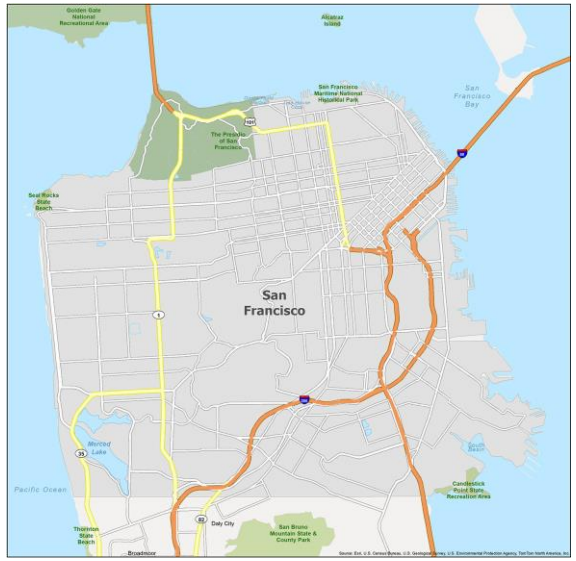
The problem

Gentrification and displacement

The process whereby the character of a urban area is changed by wealthier people moving in, displacing current inhabitants in the process.



Gentrification in San Francisco has increased significantly since the 1990s, driven by a strong demand for tech workers from local startups and Silicon Valley companies.

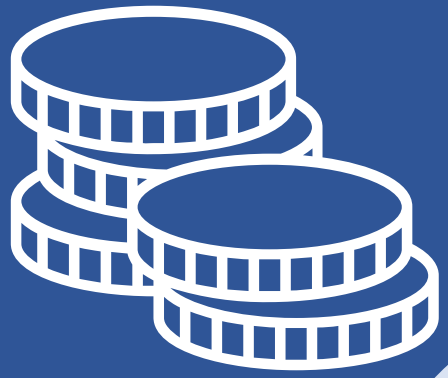
This process affected negatively the social demographic structure of the city, as SF was becoming the most expensive city in the US.

Goals

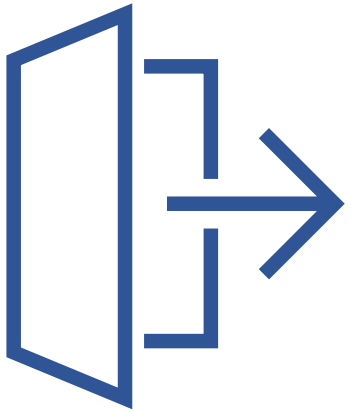
- Use statistical methods and develope models to understand how the SF housing market has changed in the last 15 years and which factors drived these changes.
- Provide to the local government tools to tackle the problem of gentrification and displacement.
- Further validate previous papers on the topic.

Dataset

Rent



Buyout
&
Evictions



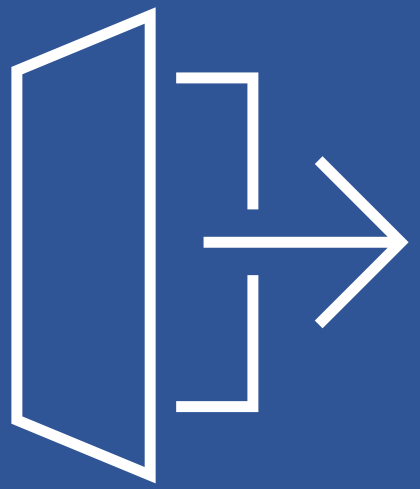
Dataset

Parcels

Constructions

Datasets

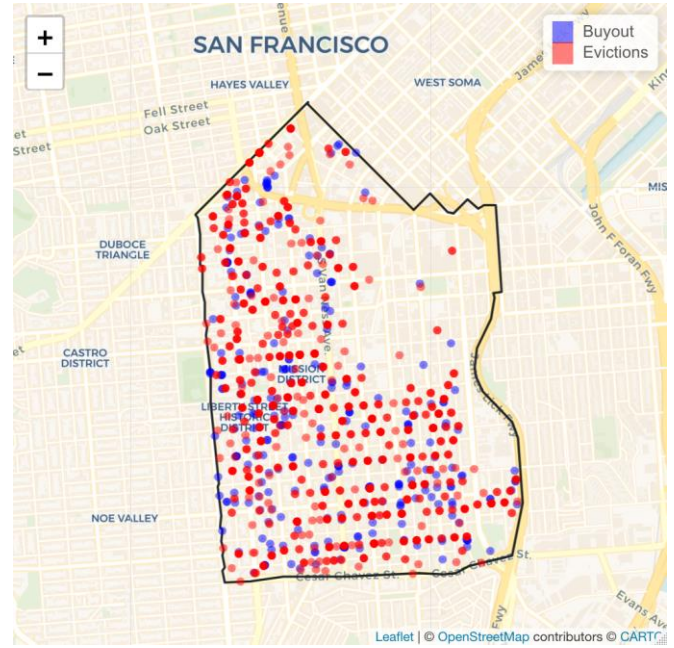
Evictions
&
Buyout



Source: SF government (datasf.org)

Main information:

- Address (geocoded to coordinates)
- Neighborhood
- Date
- Buyout amount



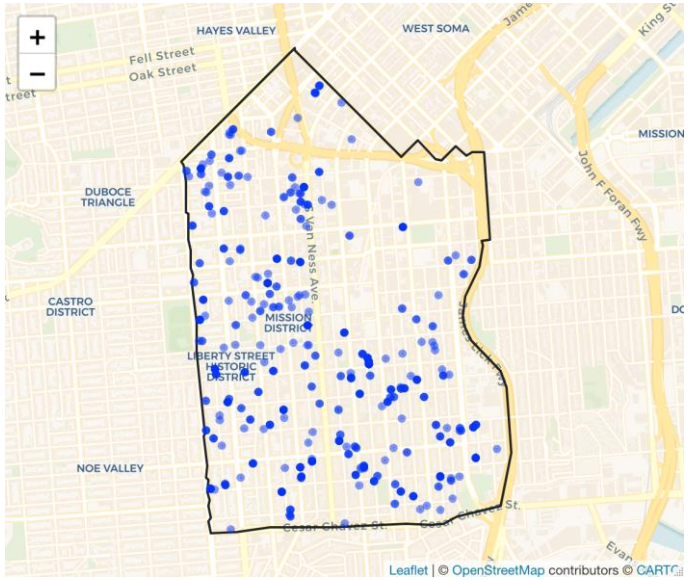
Datasets

Construction

Source: SF government (datasf.org)

Main information:

- Address (geocoded to coordinates)
- Date of permit emission
- Existing and proposed housing units



«Demand and supply» vs «Higher attractiveness of nearby houses»

Datasets

Parcel

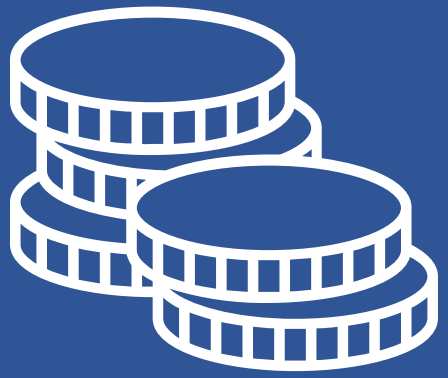
Source: SF government (datasf.org)

Main information:

- Latitude and longitude of the vertices of the parcel
- Number of house units for each parcel

Datasets

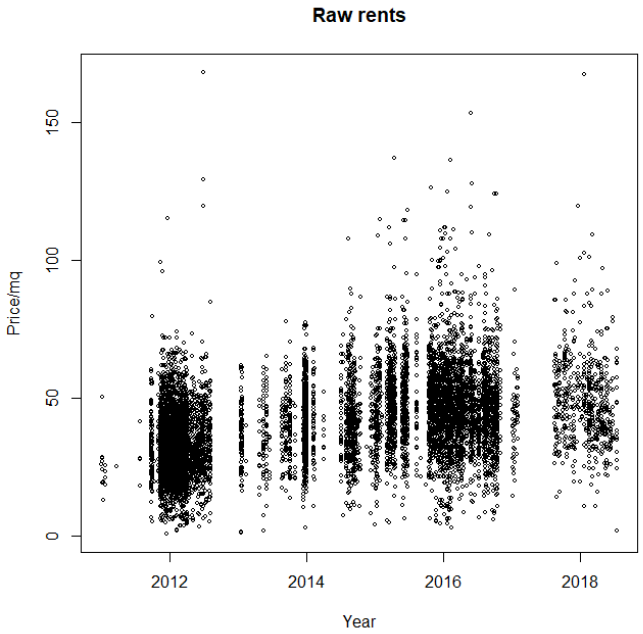
Rent

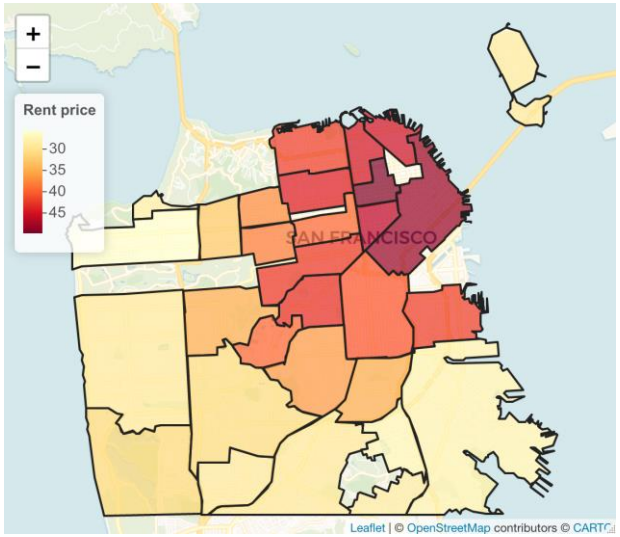


Source: Craiglist.com

Main information:

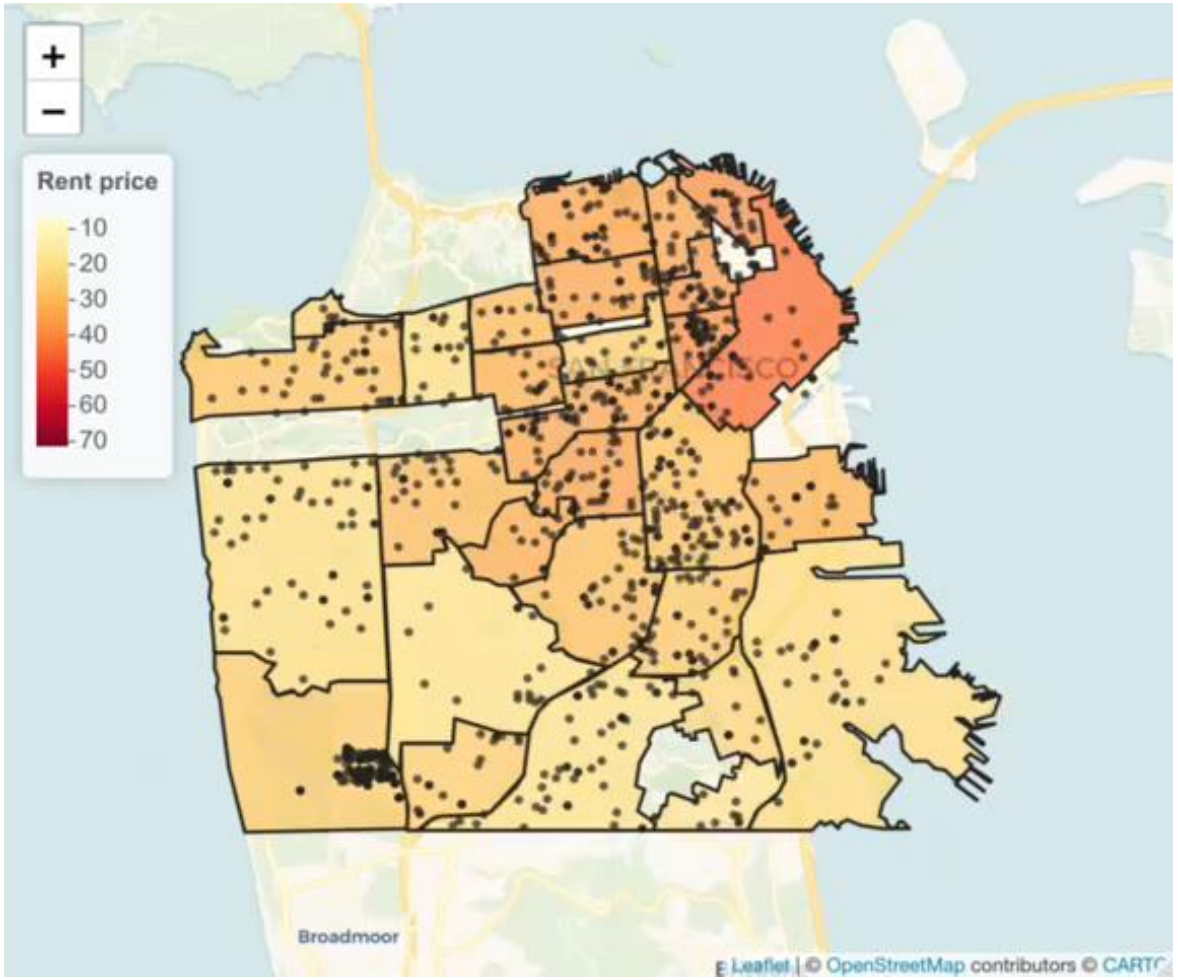
- Neighborhood
- Price/mq
- Date of the advertisement



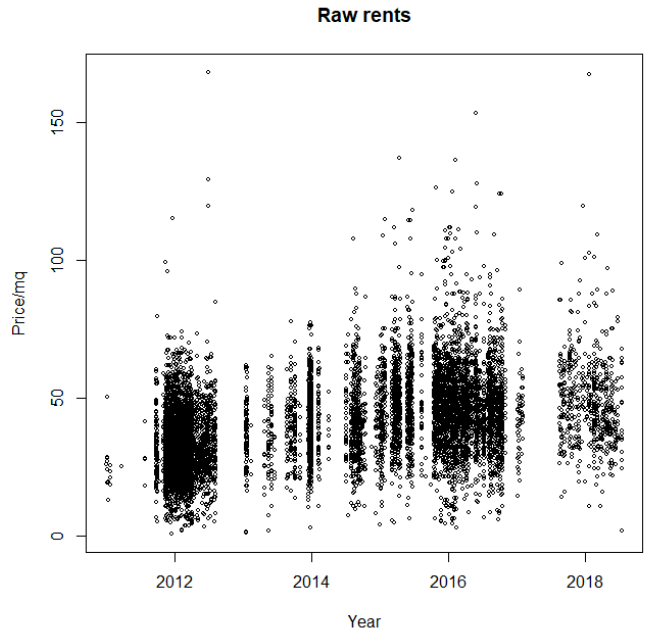


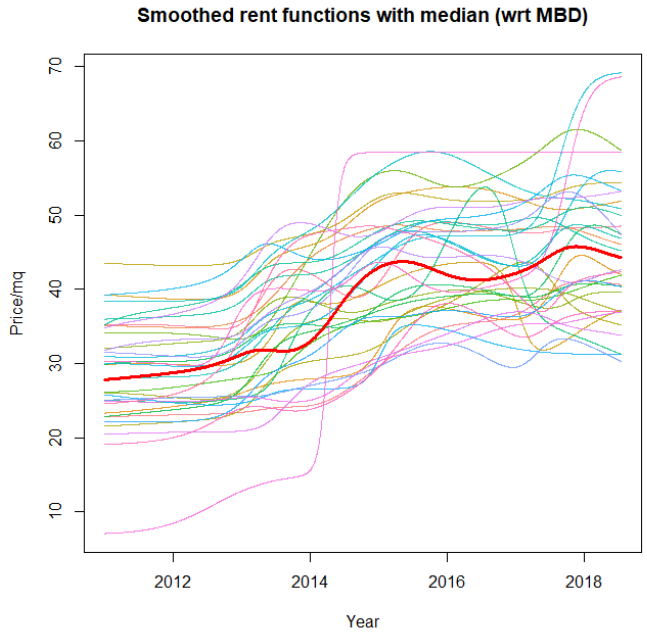
Exploratory analysis

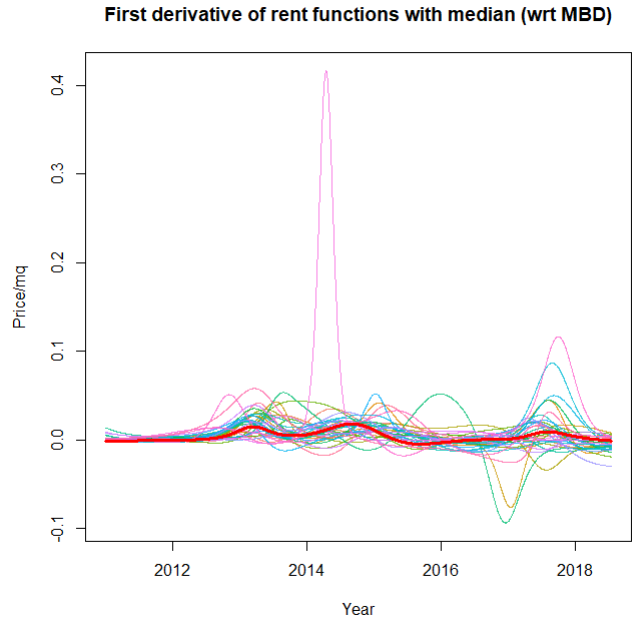
Map of prices and evictions evolution



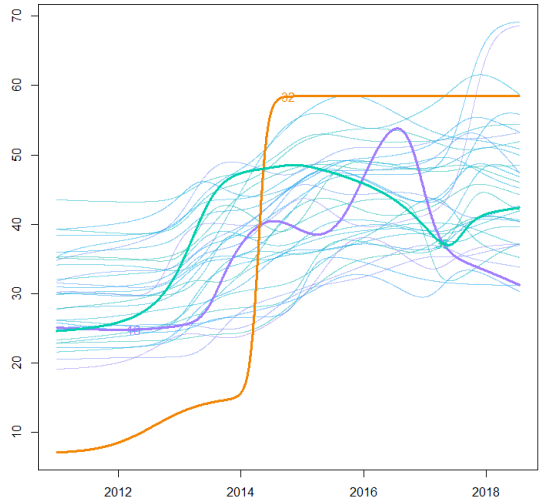
Rent functions

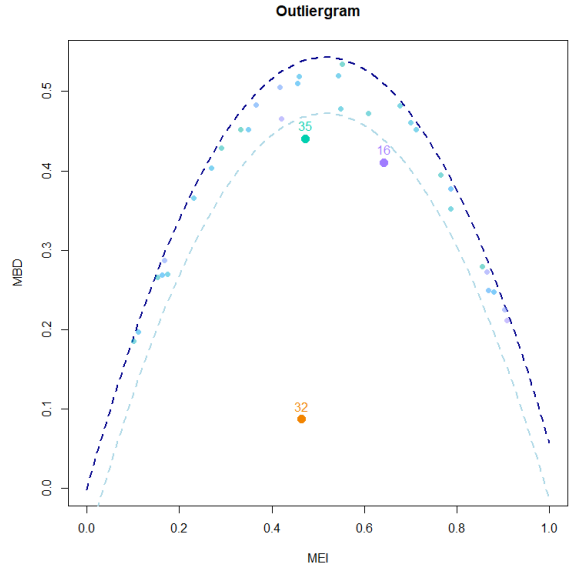






Outlier detection





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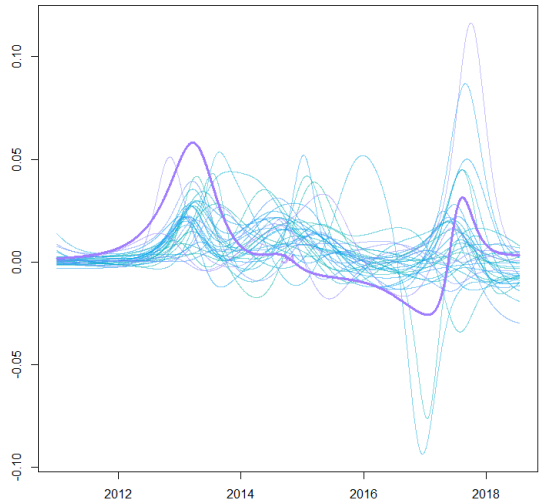
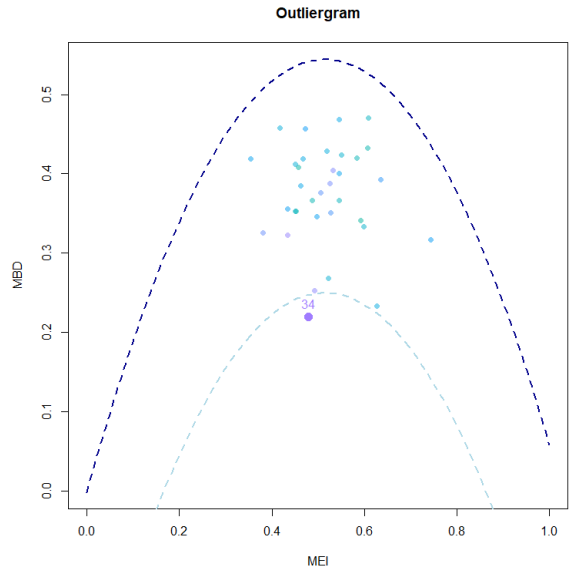
Treasure Island





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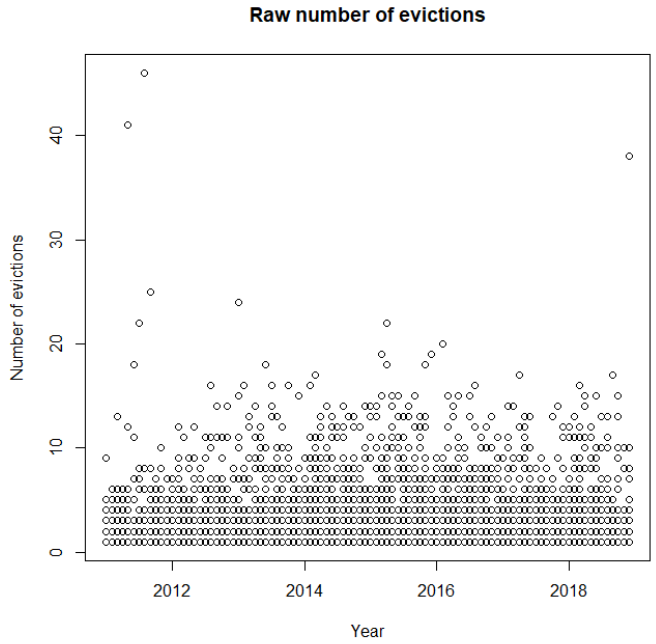
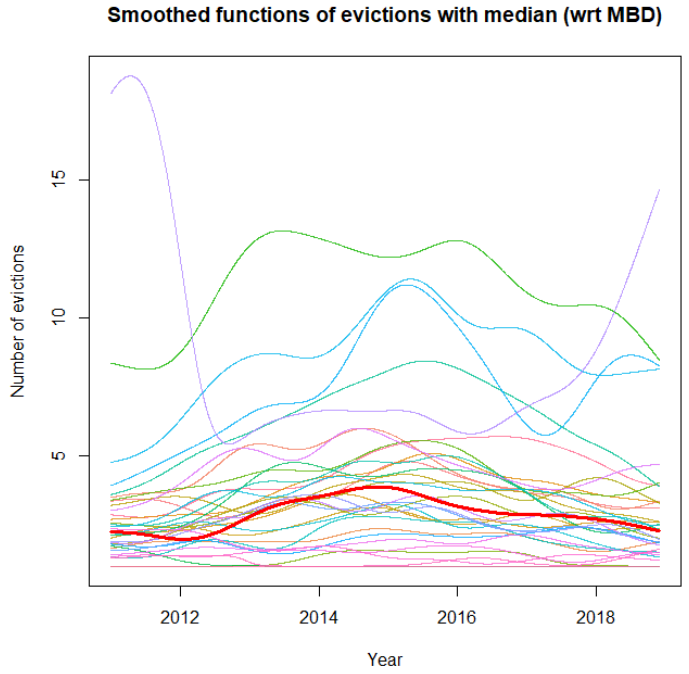
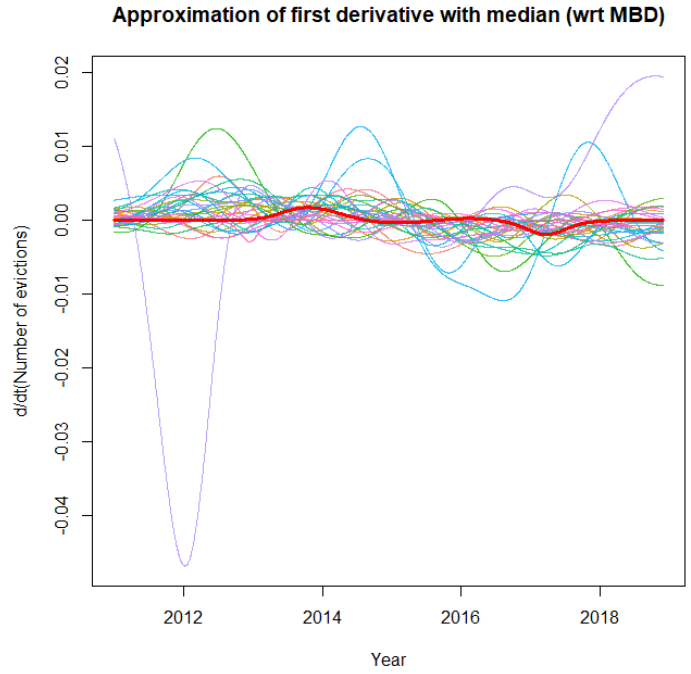
Western Addition

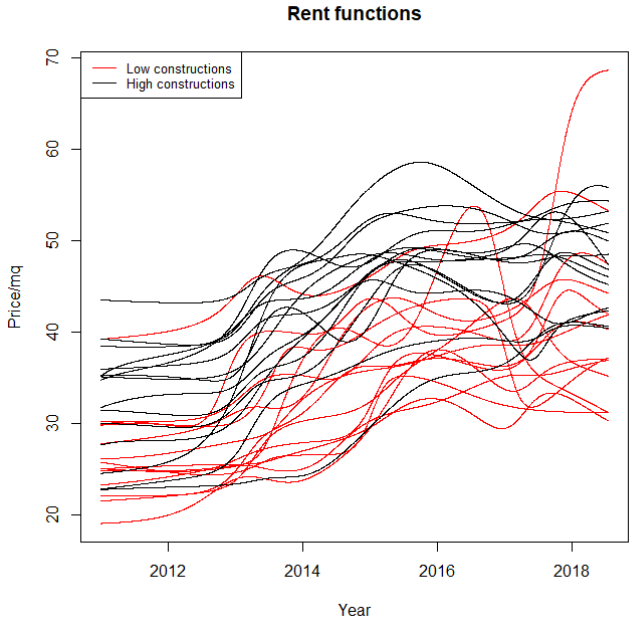
Eviction functions

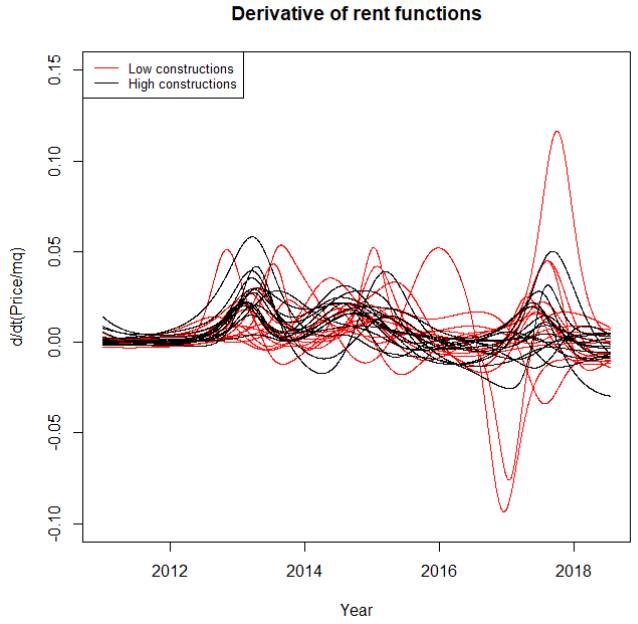


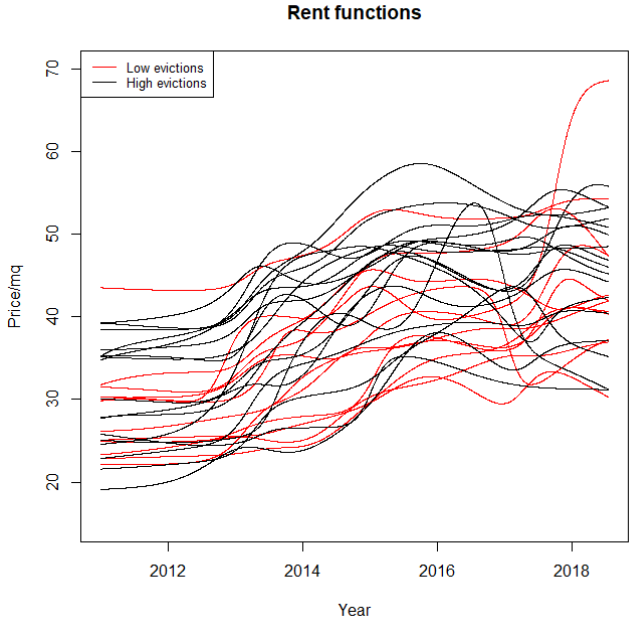


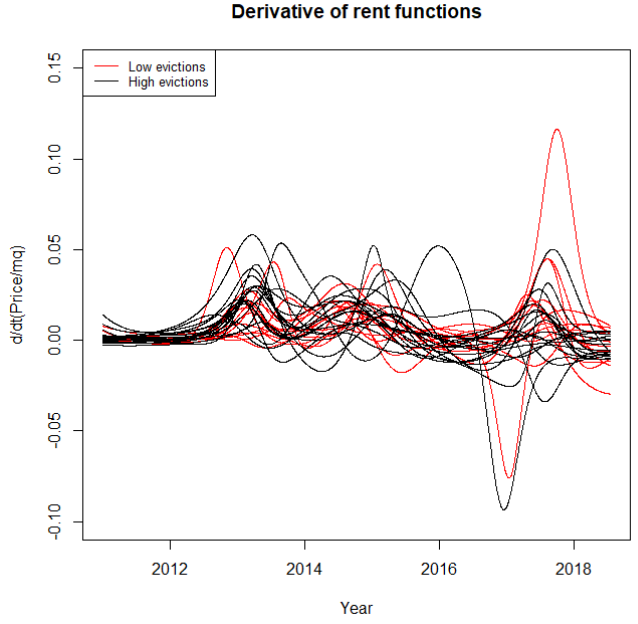


Tests on rent functions





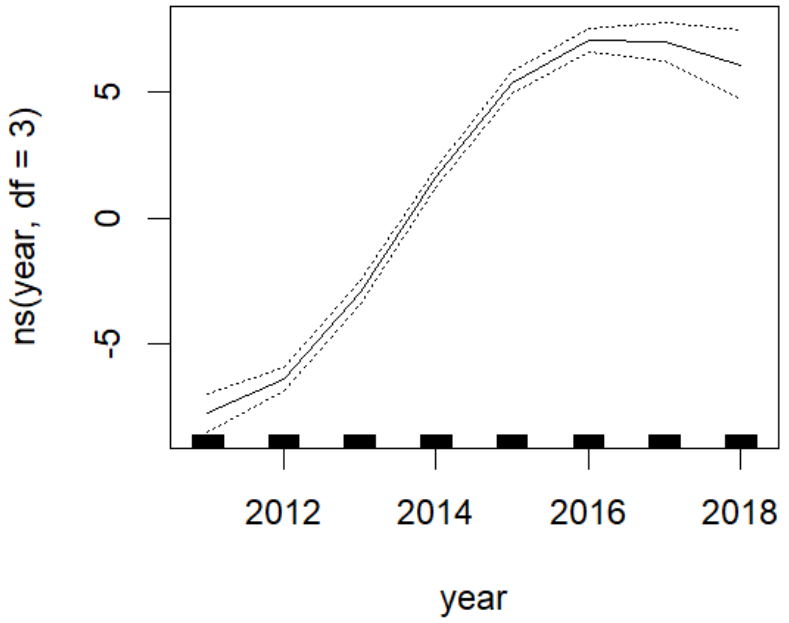


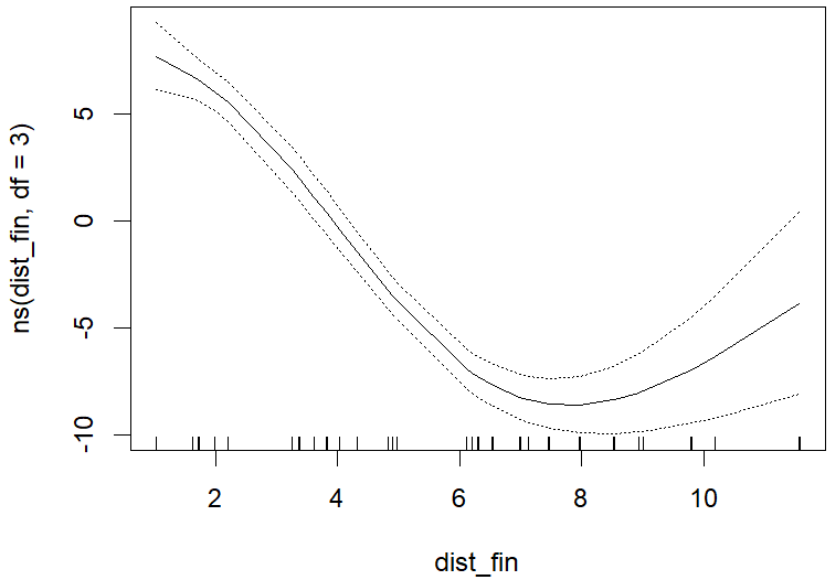


Constructions effect

GAM model with neighborhood granularity

$$rent \sim year + \sum_{t=year-4}^{year} new\ constructions_{nhood,t} + dist\ financial\ district_{nhood} + dist\ Caltrain\ Station_{nhood}$$





Future analysis

GAM model with parcel granularity

- Smoothing of the rent prices over the residential area of SF
- Calculation of the amount of new costructions close to each parcel
- Implement a GAM model based on:

$$rent_{parcel,year} \sim nhood_{parcel} + year + nhood{:}\,year$$
$$+ \sum_{t=year-threshold}^{year} \#new\ constructions\ within\ 0.1\ ,0.5\ ,1,2\ km_{parcel,t}$$
$$+ dist\ from\ financial\ dist_{parcel}$$

- Consider to add other variables, such as ‘Google bus stops’

Other ideas

- Implement a GAM model based on:

$$evictions_{nhood,year} \sim rent\ price_{nhood,year} + nhood + year + nhood{:}\,year + \sum_{t=year-threshold}^{year} \#new\ constructions_{nhood,t}$$

- Improve the functional tests by using different partitions (e.g. functional clustering)
- Consider to add methods based on conformal prediction and robust statistics