

EFFECT OF RENT CONTROL ON HOUSING QUALITY: EVIDENCE FROM NEW YORK

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Background

Rent control has been an important housing policy in cities like New York City. While the goal of such a policy is to make housing more affordable, studies have found that rent control may have unexpected negative impact on the housing market. More specifically, previous literature has come to an disagreement in terms of how rent control affect housing quality: while some literature finds that rent control has an negative impact on housing quality (Moorhouse, 1972; Albon & Stafford, 1990; Gyourko & Linneman, 1990), some literature suggests that such impact is limited (Olsen, 1988; Rydell et al., 1981). The rent control in New York City has specific requirements on rent increase in response to home improvements. The Rent Act of 2011 also made specific changes to such requirements. With this background, it is important to answer the research question below.

Research Question

Does rent control have a negative impact on the housing quality in New York City?

Data

We use the data from the 2014 New York City Housing and Vacancy Survey (NYCHVS) to study the effect of rent control on housing quality. In particular, we use data on the occupied rental units. The total sample size is 8791, with 4966 rent controlled units and 3825 uncontrolled units.

How We Measure Housing Quality

We make use of ten features of housing quality asked in the NYCHVS to compute a score for each housing unit. The default score is 0. For example, if there have been heating equipment breakdowns, we deduct one point from the score. If no heating equipment breakdowns have occurred, we add one point to the score. Thus, we obtain a housing quality score for each of the occupied units in our sample. We then categorize each of the housing units as "in good condition" if the score is higher or equal to the mean score or "in bad condition" if the score is lower to the mean score.

Table 1: Housing Condition by Rent Control Status

Unit Condition	Rent Control Status		Row Sums
	Controlled	Uncontrolled	
In good condition	2942	2763	5705
	(51.57%) (59.24%)	(48.43%) (72.24%)	(64.90%)
In bad condition	2024	1062	3086
	(65.59%) (40.76%)	(34.41%) (27.76%)	(35.10%)
Column Sums	4966	3825	8791
	(56.49%)	(43.51%)	

Explanatory Variables:
What May Affect Housing Quality

Table 2: Explanatory Variables

Variable Name	Values
(I) Borough dummies	(a) Bronx
	(b) Brooklyn
	(c) Manhattan
	(d) Staten Island
	(e) Queens (the omitted category)
(II) Building age dummy - Old	(a) Old = 1 if built before 1947
	(b) Old = 0 if built after 1947
(III) Rent control status dummy - Control	(a) Control = 1 if rent controlled
	(b) Control = 0 if uncontrolled
(IV) Number of Units in Building dummy - More units	(a) More.units = 1 if building has at least 50 units
	(b) More.units = 0 if building has less than 50 units

Models

This study uses two models to study the effect of rent control on housing quality, including a logistic regression model and a random forest. We also compare the performances of these two models.

- Traditional Model – Logistic Regression: We first use a logistic model similar to the one used by Gyourko and Linneman in their study, which is a traditional model used for such a study:

$$P(\text{In Good Condition} = 1) = \frac{e^{X'\beta}}{1 + e^{X'\beta}}$$

- More Computationally Enhanced Methods – Random Forest: Using the same sample and variables, we construct a random forest with the help of the Scikit-learn package in Python. Using the RandomizedSearchCV method, we find the optimal tuning parameters and construct the random forest accordingly.

Logistic Regression Results

Table 3: Logistic Regression Results

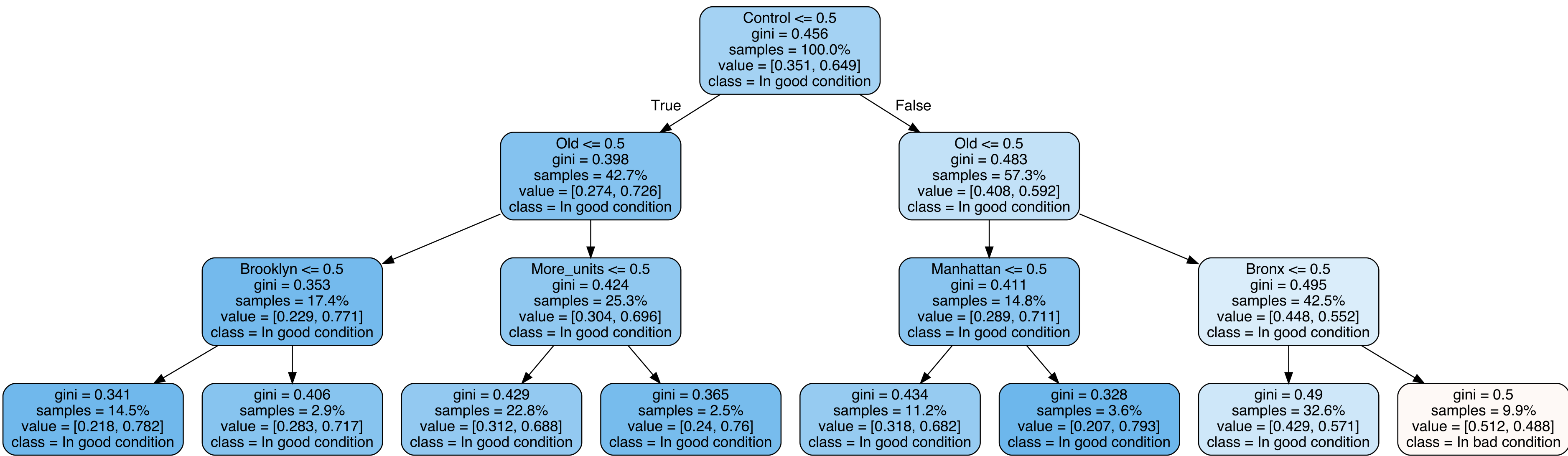
Explanatory Variables	coef	std err	z	P > z	[0.025	0.975]
Const	1.4141	0.066	21.469	0.000	1.285	1.543
Brooklyn	-0.2572	0.066	-3.915	0.000	-0.386	-0.128
Manhattan	-0.2179	0.067	-3.229	0.001	-0.350	-0.086
Staten Island	0.2386	0.166	1.433	0.152	-0.088	0.565
Bronx	-0.5131	0.075	-6.811	0.000	-0.661	-0.365
Old	-0.4737	0.056	-8.432	0.000	-0.584	-0.364
Control	-0.4657	0.050	-9.401	0.000	-0.563	-0.369
More.units	0.0834	0.054	1.545	0.122	-0.022	0.189

Pseudo R = 0.02984
n = 8791
Log-Likelihood = -5527.3

In this sample, housing units in Queens are more likely to be in good condition compared with Brooklyn, Manhattan, and the Bronx. With the largest coefficient in absolute value, we may infer that housing units in the Bronx are more likely to be in bad condition. Without surprise, older units are more likely to be in bad condition. Rent control has a significantly negative effect on the quality of housing unit. Although the positive coefficient suggests that apartments in buildings with more units are more likely to be in good condition, no evidence suggests that such effect is significant. These findings are consistent with the findings of Gyourko and Linneman (Gyourko & Linneman, 1990).

Random Forest Decision Tree

Figure 1: Decision Tree Example



These results are consistent with the results of the logistic model. More specifically, a rent controlled housing unit built before 1947 and located in the Bronx is more likely to be in bad condition. To examine the significance of the impact of rent control, we build a random forest without the rent control variable – the MSE of the model increases (0.34796900193446867 v.s. 0.35104080364205276).

Comparison of Logistic Model and Random Forest

To compare the performance of the two models, we fit the logistic model using k-fold cross validation with $k = 5$ folds and obtain the average MSE across the $k = 5$ test sets (MSE = 0.3486524365832536). The random forest methods with the optimal tuning parameters reports a slightly smaller MSE (MSE = 0.34796900193446867).

Conclusions

- Both the logistic model and the random forest methods suggest that rent control has a negative impact on the housing quality in New York City.
- Besides rent control, the age of the building (whether built before 1947) also negatively affects the housing quality.
- The housing quality varies by borough, and units in the Bronx are more likely to be in bad condition.
- Although the difference in performance is small, the random forest methods performs better than the traditional logistic regression model.

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