

Clark University

Clark Digital Commons

Undergraduate Student Research Festivals

Academic Spree Day 2021

Apr 26th, 12:00 AM

Mapping Neighborhood Change An Economics Honors Thesis

Naomi Hoffman

Clark University, ngeffken@clarku.edu

Follow this and additional works at: <https://commons.clarku.edu/asdff>

Hoffman, Naomi, "Mapping Neighborhood Change An Economics Honors Thesis" (2021). *Undergraduate Student Research Festivals*. 72.

<https://commons.clarku.edu/asdff/asd2021/asd2021/72>

This Open Access Event is brought to you for free and open access by the Conference Proceedings at Clark Digital Commons. It has been accepted for inclusion in Undergraduate Student Research Festivals by an authorized administrator of Clark Digital Commons. For more information, please contact larobinson@clarku.edu, mkrikonis@clarku.edu.

Mapping Neighborhood Change

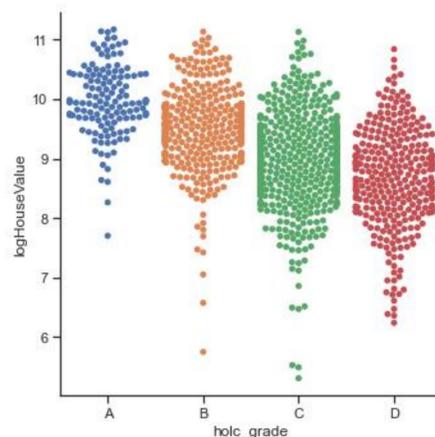
Naomi Hoffman – (Advisor: Professor Brown)

Introduction

To what extent are the HOLC maps predictors of long-standing neighborhood change in U.S. cities?

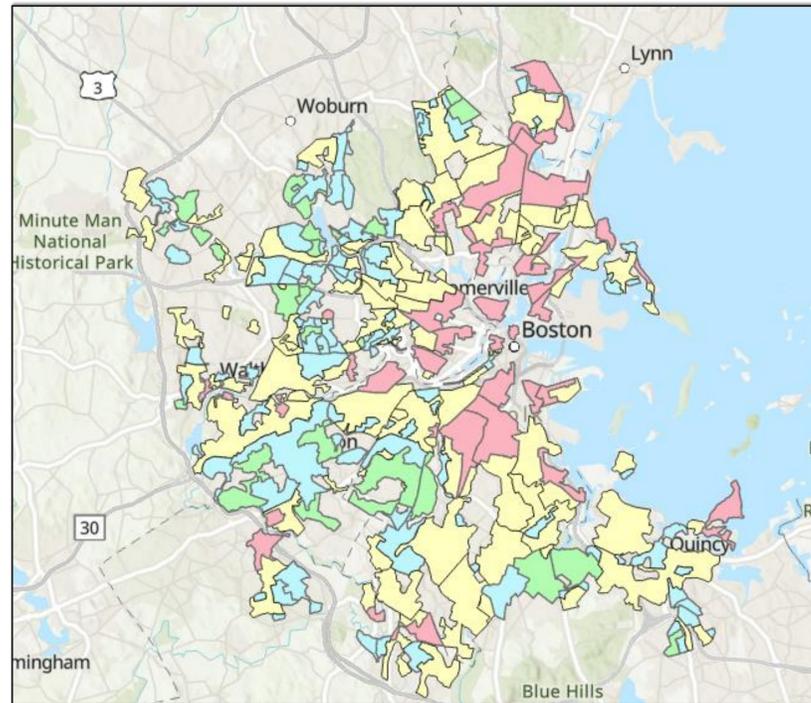
Motivation

- HOLC Residential Security Maps design was inherently discriminatory, and they are credited with the start of “redlining” practices.
- Studying the power of these maps can help us better understand the complexities of discriminatory economic practices.
- By using the log of the house values of these neighborhoods as a proxy for neighborhood quality and the change between these values as the change in the neighborhoods, are the maps predictors of this change?



Introduction of HOLC and Neighborhood Change

- The Federal government's Home Owners' Loan Corporation (HOLC) created maps between 1935 and 1940 for about 200 cities.
- They provide guidance on which neighborhoods within a city were good investments.
- The determinants of neighborhood change are not entirely agreed upon:
- **Maps Create Change in Neighborhoods.** Manuel Aalbers (2014), argues that the maps created by HOLC---and others---do not just represent what exists in a place, but instead influence the places they are made about. If this is true, we may find that the differences in neighborhoods home values becomes greater by the 1980s.
- **Filtering.** As housing units age, it will be subject to a decline in the level of housing quality as it depreciates. The demand for housing is income-elastic so the reduced quality of available housing will lead to downward filtering to low-income residents. Arnott and Braid (1997) , Rosenthal and Ross (2015) .



Example HOLC Map shown in ArcGIS

logHouseValue1980 & logHouseValue1940

We expect a strong relationship between the log of the median house value in both the 1940s and 1980's and a higher HOLC grade.

ΔlogHouseValues

We expect the relationship between difference in the logs of the median house value in the 1940s and 1980's and an HOLC grade is not linear. That is, the relationship may be positive for some grades but not others.

Other Variables:

- **GradeA:** In demand as residential locations in “good times” or “bad”.
- **GradeB:** Neighborhood that's still good, but not the most in-demand for buyers.
- **GradeC:** Neighborhoods lacking homogeneity; lenders advised to give conservative loans.
- **GradeD:** Neighborhoods that are highly undesirable; lenders may refuse loans.
- **%NewHouse:** Percentage of homes that are 10 years old or less, in a 1980 census tract.
- **%MiddleHouse:** Percentage of homes in a 1980 census tract that are 11-30 years old.
- **%OldHouse:** Percentage of homes in a 1980 census tract that are 30+ years old.
- **%Black:** Percentage of population in a 1980 census tract that identifies as Black.
- **%Black1940:** Percentage of population in a 1940 census tract that identifies as Black.
- **%Hispanic:** Percentage of population in a 1980 census tract that identifies as Spanish.
- **%College:** Percentage of population that are college graduates in a 1980 census tract.
- **%College1940:** College graduates, as percentage of population in a 1940 census tract.
- **South, North, Midwest, West:** Regions of the United States as defined by the Census.

Results

We start first with the models:

$$\log\text{HouseValue}1980 = \beta_1 * \text{GradeA} + \beta_2 * \text{GradeB} + \beta_3 * \text{GradeC} + 4.56789$$

$$\log\text{HouseValue}1940 = \beta_1 * \text{GradeA} + \beta_2 * \text{GradeB} + \beta_3 * \text{GradeC}$$

$$\Delta\log\text{HouseValues} = \beta_1 * \text{GradeA} + \beta_2 * \text{GradeB} + \beta_3 * \text{GradeC}$$

Then account for:

- **Filtering.** Based on the age of the housing we use dummy variables for the percent of the neighborhood made up of new houses, middle-aged houses, and old houses.
- **Demographics:** This includes race, % of college graduates, and the region of the U.S. the neighborhood is situated in. Without them, the model may put more weight than it should on the neighborhood grade once given.

	(1) logHouseValue	(2) lghouseval_1940	(3) changeinval	(4) logHouseValue	(5) lghouseval_1940	(6) changeinval
gradeA	1.288***	1.027***	0.245**	0.529***	0.402***	0.119
gradeB	0.817***	0.685***	0.162**	0.303***	0.343***	0.0404
gradeC	0.305***	0.411***	-0.0425	0.142***	0.243***	-0.0420
pctNewH				-0.546*		
pctMiddleH				0.957***		
pctBlack				-0.604***		-0.731***
pctHisp				-3.010***		-2.502***
pctCollege				1.470***		0.731***
pctBlack1940					-0.426***	0.702***
pctCollege1940					4.669***	-2.663***
_cons	8.675***	7.823***	0.776***	8.440***	7.992***	0.577***
N	1300	2502	1209	1300	2502	1209

* p < 0.05, ** p < 0.01, *** p < 0.001

Findings and Conclusion

- The first three regressions' only independent variables are the HOLC grades. You can see that they are statistically significant. In (1), a house in a Grade A neighborhood is predicted to have a value ~128% greater than a house in a Grade D neighborhood. The last regression, comparing the change in house values between 1940s and 1980s finds that the grades are not statistically significant. Here, the biggest contributor is the percent Hispanic in the 1980s and the percent of college graduates in the 1940s.
- One limitation of my research is that the maps may have simply reflected and codified pre-existing differences in neighborhoods but did not actually cause changes in credit access. There are ways of showing this (Aaronson, Hartley, and Mazumder, 2017) through more advanced GIS work, however, my research has not attempted it.