Long Shadow of Racial Discrimination: Evidence from Housing Covenants of Minneapolis[*]

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Abstract

Racial covenants were clauses in property deeds that prohibited the sale or renting of a property to specific religious and ethnic minorities. This paper studies the effect of racially-restrictive covenants, prevalent during the early-to-mid 20th century, on present-day socioeconomic outcomes such as house prices and racial segregation. Using a newly created geographic data on over 120,000 historical property deeds with information on racial covenant use from Hennepin County, Minnesota, we exploit the unanticipated 1948 Supreme Court ruling that made racially-restrictive covenants unenforceable. We employ a regression discontinuity around the ruling to document the causal and time-persistent effects of racial covenants on present-day socioeconomic geography of Minneapolis. In particular, we document that houses that were covenanted have on average 15% higher present-day house values compared to properties which were not covenanted. We also find a 1% increase in covenanted houses in a census blocks reduces black residents by 14% and reduces black home ownership by 19%.

1 Introduction

Does historical housing discrimination have a persistent effect on cities today? Given the key role agglomeration forces play in city structures, initial neighborhood characteristics set by nature, historic accident, or other factors matter considerably for present-day outcomes. What if racially discriminatory housing policies set these initial conditions when cities are first developing? What are the long-term effects of historic racial discriminatory policies on socioeconomic outcomes within cities today? This paper studies these questions by focusing on racially-restrictive covenants that were prevalent during the early-to-mid 20th century. Racially-restrictive covenants were clauses within property deeds that prohibited the sale, resale, or rental of a property to a range of non-white people but primarily targeting African-Americans. Covenants prevented people of color from living in particular areas within a city. We argue that by shaping the early socioeconomic characteristics of a city, racially-restrictive covenants have had a persistent effect on present-day house prices and the racial distribution in Minneapolis, Minnesota. We use a unique and newly constructed data set of all historic property deeds from 1910-1955 with information on racially-restrictive covenants for all lots in Hennepin County, Minnesota. We match this data with census and present-day tax assessor data to assess the long-term impact of these covenants. Using a regression discontinuity (RD) design around the unanticipated 1948 U.S. Supreme Court ruling that made racially-restrictive covenants unenforceable, we study the effects of covenants on present-day socioeconomic outcomes such as house prices and racial segregation. We find that houses that were covenanted have on average 15% higher present-day house prices compared to houses that were not covenanted. We also find a 1% increase in covenanted houses in a census blocks reduces black residents by 14% and reduces black home ownership by 19%.

Housing discrimination has taken many forms in the United States[1]. One of the instruments prevalent in American cities during the early-mid 20th century in was the usage of racial covenants. Starting in the decade before World War I, real estate platted neighborhoods and could decide racial restrictions when they divided lots. Because a single developer would build swaths of houses together, covenants legally prevented people of color from mov-

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[1]See **Appendix A** for a timeline of these events.

ing to particular neighborhoods. Thus, racial covenants effectively determined who could live where. Covenanting homes attracted higher prices relative to homes in the non-covenanted neighborhood, given similar geographic amenities. Even after covenants became unenforceable in 1948, covenanted properties saw relatively higher private and public initial investment near them, and resulted in persistent differences across city areas via path dependency (see David (1985), Acemoglu et al. (2001)).

In this paper, we exploit the unanticipated 1948 Supreme Court ruling that rendered that racially-restrictive covenant contracts unenforceable (see Rothstein (2017) and Brown and Smith (2016))[2]. Using 1948 as a cut-off point and a fuzzy regression discontinuity design, we compare the present-day outcomes of houses and neighborhoods that were developed just before or after 1948 and were similar after controlling for observed characteristics but for their ability to implement racially-restrictive covenants. Our identifying assumption is that there are no differences in unobservable quality of real estate developed right before and after the decision, other than a time trend, and should not be correlated with any of the outcomes variables after controlling for observed characteristics.

Our primary findings are that the effects of racially-restrictive covenants are ever-present today and affect socioeconomic outcomes in a significant manner. In particular, we find that houses that were covenanted, have on average 15% higher 2018 house values compared to properties which were not covenanted. Our results are also consistent with hypothesis that covenant language was exercised in the deeds of amenity scarce areas (Kaul (2019)). The high prices of homes in amenity rich locations, such as near popular lakes, served as a mechanism to restrict people of color from moving in[3]. Additionally, we find that a 1% increase of covenanted lots within a census block results in a reduction of black resident population by 14% and reduction in black home ownership by 19% when calculating elasticities at mean value. We do not find a statistically significant relationship between total home ownership rate, non-white resident population, and home ownership rates and covenant share. The covenanted property deeds were used mostly used in locations that were less coveted

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[2]The Supreme Court had reaffirmed the legality and enforceability of racial covenants in Corrigan v Buckley (1926). See Section 2 for more detailed discussion on this.

[3]Residents in these areas often employed other tools such as private investigators or buybacks to prevent affluent black families from moving in.

and could not keep people of color out through the price mechanism, effectively keeping middle-class African-Americans and other minorities buying houses in certain middle-class neighborhoods (see Rothstein (2017)).

We are agnostic about the specific mechanism that leads to the persistence effects of covenants. We discuss three possible mechanisms for the persistent effect of covenants: private investment and home quality, public investment, and preference externalities. First, home owners may have chosen to invest more in covenant neighborhoods because they were perceived as "nicer" than non-covenanted neighborhoods. Alternatively, it is possible following the 1948 Supreme Court ruling that developers were able to respond quickly to no longer charging higher prices for covenanted homes and switched to lower quality materials in new homes. Second, public investment in covenanted neighborhoods is higher relative to non-covenanted neighborhoods because they had wealthier residents. Third, residence prefer to consume similar local private goods as their neighbors and hence, choose to live in areas with residents of similar preferences. Consumption complementarity among residents generate higher home prices that persist in the long-run.

To the best of our knowledge, this paper is the first to investigate the long-term impact of racial covenants used in private transaction contracts on present-day outcomes with such detailed data. Unlike many other American cities, Minneapolis did not have racially-segregated zoning policy because it began its expansion after the Supreme Court invalidated them. Racial covenants were truly one of the first housing discrimination instruments used in this region and affected the initial geographic distribution of race. Thus, we can draw a straight line from covenants to modern segregation and racial differences in the region.

In Section 2 we describes the use and history of racially restrictive covenants, while Section 3 provides Literature Review. Section 4 discusses our newly constructed data set using the original property deeds as well as additional sources. Section 5 discusses our empirical strategy. Section 6 discusses our results and Section 7 concludes.

Figure 1: Sample Deed

Note: This deed has sample language of a racially restrictive covenants. *Source: Mapping Prejudice Project*

2 Background to Covenants and Literature Review

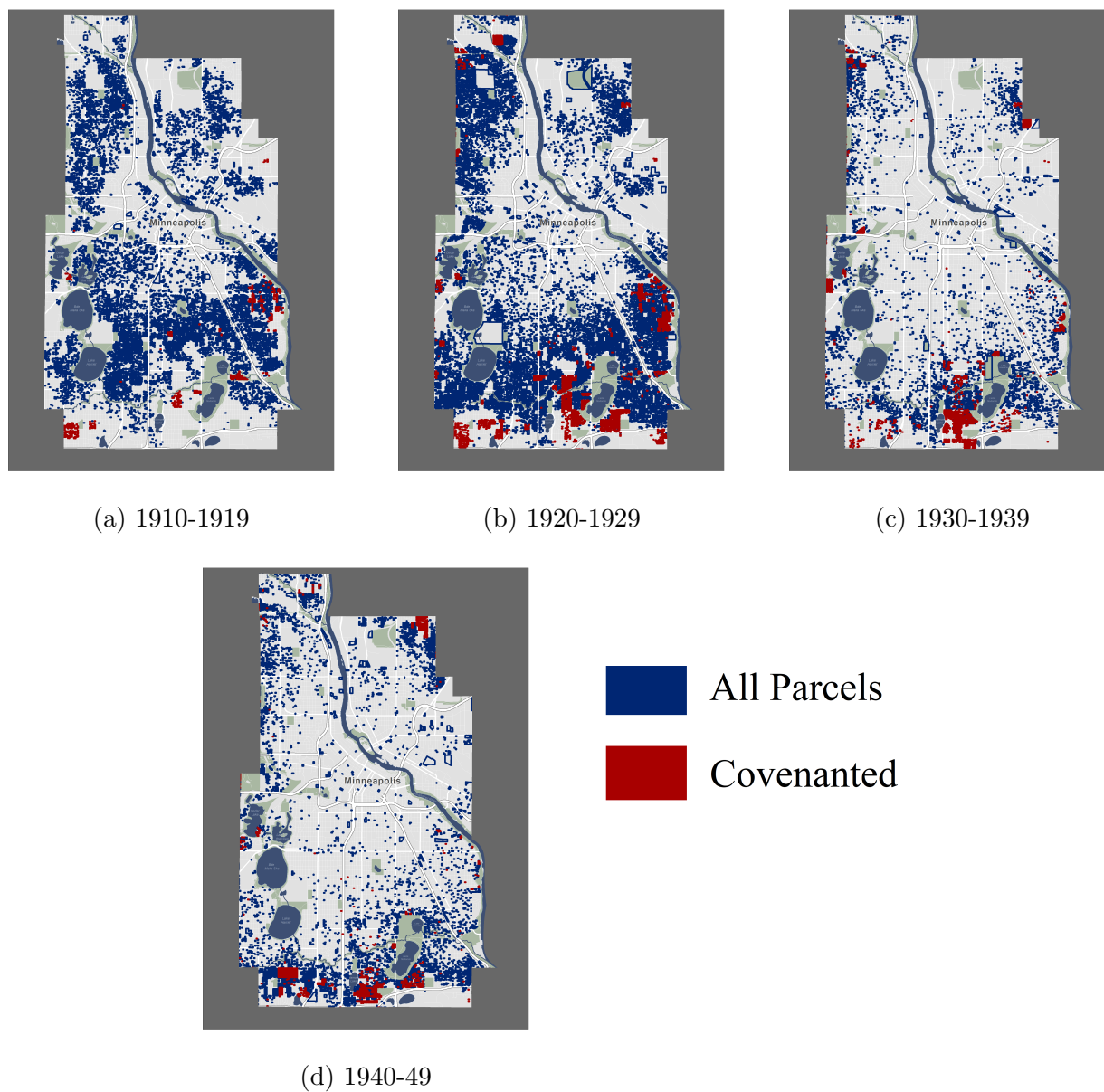## 2.1 Background to Racially-Restrictive Covenants

In Minneapolis, Minnesota, the first racially-restrictive deeds appeared in 1910. Soon thereafter, real estate companies began including the language within property deeds sold throughout the city. Outside Minneapolis, the Supreme Court decision of Buchanan v. Warley (1917) prohibited cities from enacting racial zoning policies. Increased racial tension and violence the following year led to the "Red Summer" of 1919 when white supremacists killed hundreds of African-Americans throughout the country. In response, real estate developers, public officials, and private citizens used the sale of private property to create a legally enforceable system of housing discrimination. The housing deeds during the point of sale included language which either explicitly prohibited many racial and ethnic groups from ever purchasing or residing in a home[4]. While primarily focused on preventing African-Americans from moving into neighborhoods, these clauses also excluded many other groups stating that the "premises shall not at any time be conveyed, mortgaged or leased to any person or persons of Chinese, Japanese, Moorish, Turkish, Negro, Mongolian or African blood or descent." See **Figure 1** as an example of such deeds [5].

The Supreme Court reaffirmed the legality and enforceablity of covenants when it ruled in Corrigan v Buckley (1926) that the resell of property to black families were void because of covenanted language. Following the ruling, if an individual seller wanted to sell to a minority group, past owners and even neighbors could void the transaction. With the Supreme Court

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[4]Exceptions were allowed for domestic servants.

[5]For more samples see **Appendix B**.

Figure 2: Expansion of buildings and racial covenants in Minneapolis, 1910-1949

(a) 1910-1919

(b) 1920-1929

(c) 1930-1939

(d) 1940-49

Note: Lots with racially-restrictive covenants are highlighted in red while homes built in the same period in blue. *Source: Mapping Prejudice Project.*

decision in hand, the use of covenants became widespread across much of the United States, especially by real estate developers in growing cities. This system was buttressed in 1924 by the National Association of Real Estate Boards (NAREB) when it adopted an amendment in its charter the use of covenants as part of its "code of ethics." While it was possible for an individual realtor to note keep with the code, expulsion from the association resulted in "loss of the network of contacts and information critical to the practice of the real estate broker" (Jones-Correa (2000)). Developers would often advertise the use of covenants as part of their amenities in order to attract buyers and higher prices. Minneapolis and Hennepin County's urbanization occurred concomitantly with this national trend. Many real estate developers built new homes with covenants to address the city's swelling population which grew from 301,408 in 1910 to 521,718 by 1950. As more people moved into the city and racially-restrictive deeds spread, African-Americans were pushed into confined neighborhoods. Even as the number of black residents continued to grow, large parts of the city became completely white. The prevalence of covenants both locally and nationally cannot be understated. **Figure** 2, for example, shows that there was a continued geographical spread in the spatial use of covenants from 1921 and 1951. According to our data set (see the next section), at its peak 20% of extant homes in Hennepin County were covenanted in the year they were built.

After the Second World War, many real estate developers continued to promote covenants in their property deeds. While there were repeated challenges to the Corrigan decision, these were all dismissed by lower court levels and reaffirmed the idea that that the Supreme Court would not interfere with the right to discriminate in private agreements. However, a tide shifted when the Supreme Court, citing the Equal Protection Clause of the 14th amendment, decided in Shelley v. Kramer (1948) that racially restrictive covenants were no longer enforceable and their language in property deeds to be void. This decision was followed by the Minnesota Supreme Court in 1953 which banned racially restrictive covenant clauses in future property deeds. Congressional legislation passed the Fair Housing Act in 1968 explicitly banned housing discrimination on race. By this time, however, zoning and development of Minneapolis and Hennepin County slowed and even begun to decline. However, the racial makeup of neighborhoods determined in preceding decades persisted, where the region was highly segregated with white families primarily residing in suburban areas and black families

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within select neighborhoods parts of Minneapolis. This segregation has continued for more than fifty years, suggesting the highly long lasting effect that covenants had on the racial distribution of the region.

This paper aims to address the segregation determined through the use of covenants. We examine the income and racially characteristics of geographies from 1970, 1980, 1990, and 2010 to show that racially restrictive covenants had a long-lasting effect on these neighborhoods. We show that covenanted homes also continued to receive higher prices to similar non-covenanted homes.

2.2 Literature Review

Economists have long studied the importance of an economy's initial conditions and it's influence on city development, technology adoption, and economic growth (see David (1985) and Acemoglu et al. (2001)). In the case of cities, these channels are reinforced by agglomeration forces that can generate persistent inequality across neighborhoods (see Duranton and Puga (2003), Rosenthal and Strange (2004)). Redding and Sturm (2008), Ahlfeldt et al. (2015), and Heblich et al. (2015) show how initial market access, agglomeration and dispersion forces, and commuter access of Berlin and London were determining factors in the long-run neighborhood and city structure. Economics of density indicate that residential and production externalities are highly localized and an important determinant for incomes of immobile factors, such as land. This paper, studies the effect of initial conditions set by racially-restrictive covenants on long run land and house prices and the racial distribution of residents within a city. Our paper also connects with the literature assessing the role of local neighborhoods effects on inter-generational mobility and inequality (Chetty and Hendren (2018a,b) and Chetty et al. (2018)) and industrial zoning and house prices (see Shertzer et al. (2016)).

Several studies have considered how a city's fundamentals contribute to spatial outcomes across races. Spatial discrimination, where black workers cannot freely move to certain neighborhoods, increases the cost to access of labor markets and contributes to higher black unemployment (see Zenou and Boccard (2000)). Many recent studies have examined the long-term effects of racial discrimination by focusing on credit access and the role of HOLC

maps which disproportionately effected racial minority residents through "redlining" and giving worse credit ratings to neighborhoods of people of color (see Krimmel (2017) and Appel and Nickerson (2016)). In an extensive study across the United States, Aaronson et al. (2018) use HOLC maps of 149 cities and a propensity score weighting approach to compare boundaries of similar plots of land. They show that credit access determined by HOLC maps had a significant impact on black home ownership, house values, rents, and vacancy rates[6]. Similarly, poorer and minority neighborhoods are typically zoned for new construction projects such as freeways to detriment of local residents (see Allen et al. (2015) and Brinkman and Lin (2019)). The racially-restrictive covenants studied in this paper, predate the policies of "redlining" and freeway construction and contributed to the geographic shape these policies took. Thus, some of the effects captured by the the aforementioned papers is due to racially-restrictive covenants that shaped the city structure other discriminatory policies were enactedWe are currently working on including these features in future versions of this research.. Furthermore, unlike the HOLC maps that were drawn at a more aggregate neighborhood level, this paper can capture the granular effects of racial discriminatory policies since we can map racial covenants to houses in present-day Minneapolis.

3 Data

Our analysis uses the Mapping Prejudice racial covenants (MP) data, Hennepin County tax assessor data, the Census Bureau Decennial Survey from 1940, 1950, and 2010, and the American Community Survey from 2010.

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[6]Moreover, limited credit access generates long-lasting effects on inequality through multiple channels such as education investment, (Cameron and Taber (2004)), entrepreneurship (Black and Strahan (Black and Strahan)), or consumption (Carroll (2001)).

Table 1: Summary Statistics

	Non-covenanted	**Covenanted**
Total Home Value	283,377 (166,628)	307,989 (99,990)
Parcel Sq. Ft	6,888.64 (5,649.25)	5,995.12 (1,170.33)
Bedrooms	3.05 (0.92)	3.18 (0.73)
Bathrooms	1.73 (0.77)	1.78 (0.68)
Fireplace	0.57 (0.77)	0.78 (0.70)
2010 Med HH Income	73,613.12 (25975.02)	79,634.44 (18,243.86)
2010 Share 18+	0.79 (0.08)	0.77 (0.06)
2010 Share White	0.72 (0.16)	0.74 (0.09)
2010 Population	65.65 (35.10)	623.30 (15.82)
Observations	10,796	1,029

Note: This tables summary statistics. The variables House Value and Year Built are from Hennepin County Tax Assessor data. House Value is for 2017. Variables on income is from 2010 Census and the share of races is from 2010-2014 ACS estimates.

3.1 Mapping Prejudice Data

3.2 Assessor Data

Hennepin County assessor office regularly compiles modern housing characteristics and valuations of homes for tax purposes. Our data set comes directly from the assessor's office and capture the housing characteristics between 2015-2018. This data includes the house's build year, geo-spatial location, square footage, lot size, number of stories, and other such characteristics. For our main analysis of houses/lots constructed between 1945-51. The mean home value over this period is $301,302.5 and was built in 1948 (see **Table 1**). Using the build year of the houses as well as their geographical location, we are able to identify and merge the MP and assessor data to determine which modern homes reside on covenanted lots.

3.3 Census and American Community Survey

We combine the above two data sets with demographic data from the Decennial Censuses of 1940, 1950, and 2010. The Census data on race of residents, age, and home ownership are available at census block level. The income data at census block group level is from the American Community Survey 2010. While the MP data covers all lots in Hennepin County, the census data from 1940 and 1950 covers Minneapolis only. This restricts our analysis to the city of Minneapolis. We have a total of total of 91 census enumeration districts (1940-50 census), 1806 census blocks (2010 census), 218 census block groups (2010 census), 76 census tracts (2010 census), and 18 zip codes in the final data set. In 2010, the average block is 61.1% white and 10.6% black with a mean annual income of $77,722 and $44,720 for all and black families, respectively. We summarize this data between covenanted and non-covenanted homes in **Table 1**.

3.3.1 Enumeration Districts for 1940 and 1950 Census

The census divisions have changed overtime with enumeration district being the 1940, 1950 equivalent in size but not geography to modern census tracts which started in 1970. We

created these enumeration districts and mapped them to modern National Historical Geographic Information System (NHGIS) spatial identifier using old maps and location descriptions. We then the old joined enumeration districts identifiers with the present day home's NHGIS identifiers. Since this a cumbersome process, we have constructed the enumeration districts for the city of Minneapolis only. This is why our analysis, at this point, does not contain data from the remainder of Hennepin county.

4   Racially-Restrictive Covenants and House Prices

4.1   Empirical Strategy

In order to understand the persistence of housing discrimination, our goal is to identify the causal effects of the historic racially-restrictive covenants on several modern socioeconomic and geographic outcomes. Our outcomes of interest then are divided between individual level and geographic variables where economies of density play a major role. The outcome variables are the individual house valuations in 2018.

The main variable of interest is the use of racially-restrictive covenants in a lot in the past. For individual house level analysis, this variable is a dummy of covenant use for that lot. For geographic area level analysis, this variable is the share of lots covenanted in a census block[7]. Thus, the treatment group is covenanted lots, while the control group is not-covenanted lots. We use census data and individual house characteristics as controls as described in the Section 4.

To causally identify the effects of racially-restrictive covenants on socioeconomic outcomes today, we need to address the endogeneity concerns in this problem. There is a possibility that locations (or lots) with better or worse unobserved quality increased the the likelihood of the lot being covenanted in the past. This is a problem for us if the unobserved quality is also correlated with the outcome variables like 2018 house prices. In addition, we only observe racially-restrictive covenants but not other types of non-racial covenants associated

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[7]Note that the independent variable is not whether a land deed has covenant attached to it but whether the covenant had any legal standing. This is applicable for 99% of new deeds we observe in the time frame between 1945-1951.

Figure 3: Racial Covenants and Amenities–Lake Nokomis
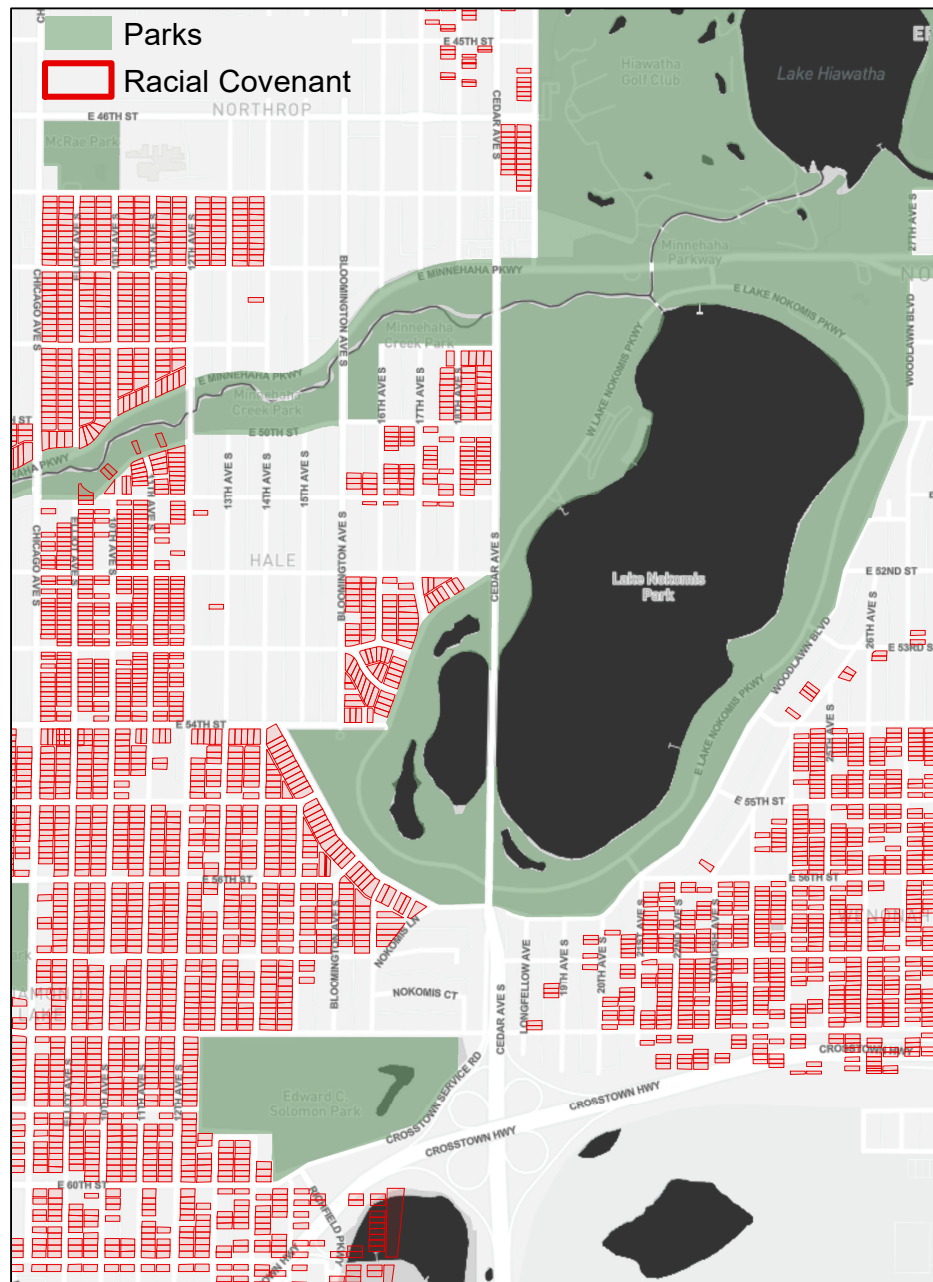
Note:This figure plots racial covenants around Lake Nokomis. Data from Mapping Prejudice project.

with that lot. These covenants could be correlated with the individual or geographic outcome variables. In fact, there is some evidence that the lots that were covenanted were in areas with low natural amenities (Kaul (2019)). At high amenity locations, such as houses near popular lakes, the price mechanism was enough to keep people of color out. In contrast, covenants were used mostly used in locations that were less coveted (and hence, cheaper) and could not keep people of color out. For real estate developers, using covenants was a mechanical way to increase the desirability of a particular area and increased the value of which houses were sold. In the southern Minneapolis area of Lake Nokomis, for example in **Figure** 3, show how most of the neighborhood as covenanted. The lake was actually embedded in marshland and considered an unattractive location to live. Covenants were able to transform the area into a middle-class white enclave for Minneapolis. Rothstein (2017) argues that covenants became effective tools to keep middle-class African-Americans from buying houses in these neighborhoods. Thus, we expect a negative omitted variable bias in our OLS estimates. To alleviate this issue, we use a fuzzy regression discontinuity (RD) design.

4.2   Fuzzy Regression Discontinuity Design

We exploit the 1948 Supreme Court (SC) ruling that made racially restrictive covenants unenforceable to address endogeneity concerns discussed above. The RD design uses the 1948 ruling as a cutoff before which lots could be covenanted with some positive probability while after the SC ruling that probability fell to 0 (see **Figure** 4 which plots covenanted deeds over time). In the RD approach, identification of the covenants' effects comes from the change in these probabilities of being covenanted while no change in the unobservable quality of a lot being built within a narrow window around the 1948 cut-off point. The fuzzy RD model permits a non-linear time trend to account for unobservable quality to change over time. Using the data on the year of house-built and execution date of housing covenant deeds, we identify houses built right before and after the 1948 ruling. We restrict our analysis between three time windows: 1945-1951, 1946-1950, and 1947-1949. In addition, to the time trend, which we allow to be non-linear, we allow for other factors such as location income, density and location dummy variables to be correlated with the choice of racially-restrictive

Figure 4: Regression Discontinuity on Covenant Deeds around 1948 Decision
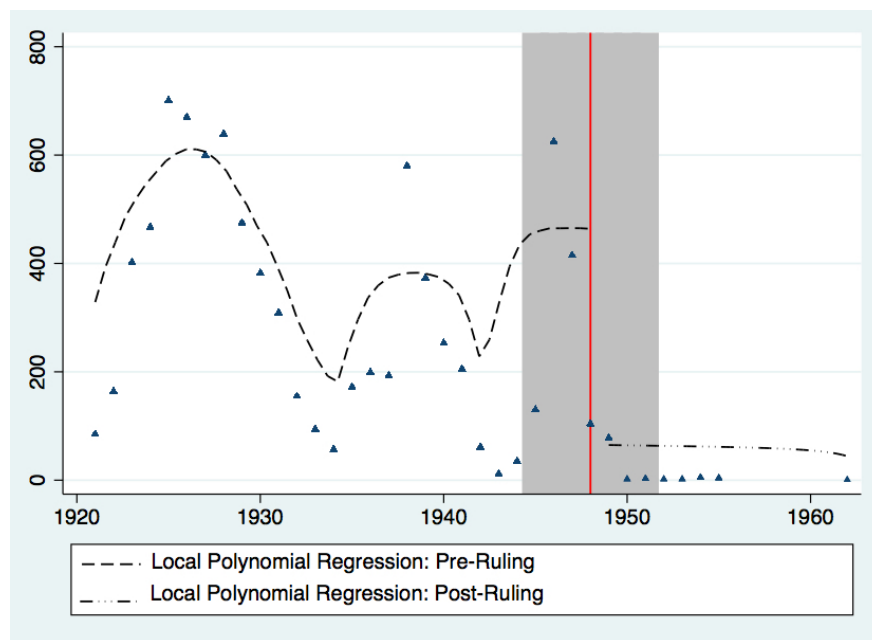
Note: This figure presents the local polynomial regression of covenant deeds execution date around the discontinuity of the 1948 Supreme Court decision between 1920-1960. Data is from Mapping Prejudice. In 1948 covenants become legally unenforceable.

covenants.

The identifying assumption we make is that unobservable quality of location is not different immediately before and after 1948, other than a time trend, and should not be correlated with any of the outcomes variables listed above. Because the 1948 ruling that made covenants unenforceable was not anticipated, the cutoff point is as good as randomly assigned and does not suffer from the usual problems that RD in time designs suffer from. Contemporary observers expected that the 1948 ruling to move in a similar direction as the 1926 ruling by the U.S. Supreme Court upheld the legality of racially restrictive covenants (see Jones-Correa (2000) and Rothstein (2017)). We model the fuzzy RD design as a 2SLS IV approach Angrist and Pischke (2008). Our analysis consists of an individual and geographic level: household and census block level, respectively.

4.3   Empirical Model: House Level

An individual household j located in a census block i in present-day time period t (2018 for our dependent variable and 2010 for our independent variables) has house assessed value Y_{ijt}. The empirical model is given as:

$$\log Y_{ijt} = \alpha_0 + \alpha_1 1\{cov_{js}\} + \beta_1 X_{jt} + \beta_2 X_{it} + \theta \eta_i + \epsilon_{ijt} \tag{1}$$

$$1\{cov_{js}\} = \gamma_0 + \gamma_1 1\{pre1949_{ej}\} + f(Date_s) + \beta_2 X_{es} + \eta_e + \epsilon_{ejs} \tag{2}$$

where $\mathbb{1}cov_{js}$ is dummy for a house covenanted in s time period 1945-1951 (or a sub-sample of this time period). X_{it} are census block/tract controls, X_{jt} are house characteristics, and η_i captures neighborhood dummy effects. γ_1 captures the probability of a lot being covenanted, given that it was built before the 1948 ruling (1948 is inclusive). e is a census enumeration district and η_e captures the enumeration district dummy effects. In addition to the linear time trend in the equation above, $f(Date_s)$ is an nth-order polynomial in time, estimated flexibly.

The individual house characteristics we use are parcel area (in square feet), number of bedrooms, fireplaces, bathrooms, roof type, construction type, exterior type, school district,

and watershed district. In our robustness checks, we exclude many of these variables without any changes of our overall results. We restrict our analysis to lots that are residential but exclude multifamily apartment complexes. The analysis is limited to extant houses only. For census control variables at time $t = 2010$ we use block population density, share of people above 18, and share of white residents at block level, and median income at tract level. For past census controls, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level.

4.4   Individual House Price Results

The results of time-persistent effects of covenants on present-day house prices are presented in **Table 2**. The table presents the OLS (model I and II), first-stage (model III), and results from the fuzzy RD design (models IV and V) with log house valuations (2018) as a dependent variable. All models limits analysis to year of houses built 1945-1951, both years inclusive. The OLS results from model I and II find that a lot being covenanted increases the present-day house values by 4.9% (without home characteristics) and 2.9% (with home characteristics). Both models control for location characteristics, location dummy at zip-code level and clustered standard errors at census block level. However, this estimate suffers from omitted variable bias where the unobservable location quality is the omitted variable. We believe that the estimated effect of 2.9% has a negative bias since covenants were used less in the most coveted locations with better amenities. As discussed previously, the price mechanism in high amenity locations was enough to keep people of color out. The covenants were used mostly used in locations that were less coveted and could not keep people of color out using high home values (Kaul (2019)).

Model III presents the estimate from first-stage regression model of correlation between house being built right before the 1949 cutoff point and whether it was covenanted. After using location dummies and clustered standard errors at enumeration district level, we find that a house being built before the Supreme Court ruling increases the probability of it being covenanted by 0.194 times. A flexible time trend estimation around the cutoff point finds that a 2nd-degree polynomial is a best fit. This model also uses location controls for 1940 and 1950. **Appendix D.1** presents tests for valid instrument which reject the null hypothesis

Table 2: Fuzzy RD Results: Individual House Values

Dep. Var.	OLS (I)	OLS (II)	First-Stage (III)	RD-IV (IV)	RD-IV (V)
	Log House Value	Log House Value	Covenanted	Log House Value	Log House Value
Covenanted	0.049*** (0.009)	0.029*** (.007)		0.309*** (0.050)	0.133*** (0.030)
Dummy built 1948			0.194*** (0.011)		
Time Trend Poly	N	N	Y	Y	Y
1940 region Dummy	N	N	ED	ED	ED
2010 region Dummy	Zip	Zip	N	Zip	Zip
Housing Characteristics	N	Y	N	N	Y
1940/50 Census Controls	N	N	Y	Y	Y
2010 Census Controls	Y	Y	N	Y	Y
Clustered S.E.	Block	Block	ED	Block	Block
Observations	11,003	10,998	11,003	10,667	10,662
R-sq	0.608	0.811	0.80	0.581	0.806

Note: This table presents the OLS, first-stage, and IV results from the fuzzy RD design with log house values (2018) as a y-variable. The analysis is restricted to 1945-1951. The main explanatory variable is a dummy for being covenanted. The instrument is a dummy for a house being built before the RD cut-off point of 1948 (Dummy Built 1948). The time trend is a 2nd-degree polynomial. The 1940 region dummies are at census enumeration district level while the 2010 region dummy is at zip code. The individual house characteristics are parcel area (in square feet), number of bedrooms, fireplaces, bathrooms, roof type, construction type, exterior type, watershed district, and school district. The 2010 census control variables are census block population, share of people above 18, and share of white residents at block level, and median household income at census tract level. For past census controls, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block level or enumeration district level. The data comes from census (1940, 1950, 2010), ACS (2010), Hennepin county tax assessor data, and the Mapping Prejudice project.

of dummy covenant being exogenous. The Shea's partial R-squared value is 0.1826, making dummy for being built before 1949 a valid instrument.

Models IV and V (preferred specification) presents the main results from the 2SLS IV fuzzy RD design with location dummies at zip-code without and with housing characteristics. Using a 2nd-degree polynomial time trend and clustering standard errors at block level, we find that a house using racially-restrictive covenants has, on average, 14.22% higher house value in 2018 in our preferred specification. The effect of being covenanted drops as we use location dummies for smaller geographic locations, moving from 18 zip-codes (14.22%) to 218 census block groups (3.7%). We believe that this captures some the externality of lots being covenanted which is positively correlated with higher public investment such as parks and negatively correlated with construction of highways (see **Appendix 6**). Additionally, as can been seen from **Appendix E.1**, the better rated parts (blue and green) of the HOLC maps mostly overlay with the covenants, suggesting more public and private investment near covenanted lots. For this reason, our preferred specification is model V[8].

Table 3 presents some robustness results from different bandwidth around the cut-off point of 1948 and a "Donut" RD. We find that our results do not change significantly as we change the bandwidth from 1945-1951 to either model II 1946-1950, where the 2018 house values are 13.54% higher or model III 1947-1949, where the 2018 house values are 13.42% higher. We do not go further out of the bandwidth 1945-1951 to not only stay closer to the boundary but also to not confound our results with effects of the Second World War. Model I, which represents the "Donut" RD results excluding years 1948 and 1949 to mitigate concerns about short-run selection or anticipation effects, finds similar results where the 2018 house values are 16.76% higher if they had racially-restrictive covenants. We also test the "Donut" RD results by removing year 1948 and 1947-49 and find similar statistically significant results.

We test for the possibility of over-fitting from global time trend polynomial in all our

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[8]We also explore the effect of covenants in the medium-term by examining homes sold between 1985-1990. In **Appendix D.3**, we show that covenants still had a significant effect on home prices by following a similar regression using 1990 census characteristics. We show that covenants cause an 11% increase in home sale prices from that period.

Table 3: Robustness Tests for Fuzzy RD Results at House-Level Analysis

	RD-IV (Donut) (I)	RD-IV (1946-1950) (II)	RD-IV (1947-1949) (III)	Placebo (1931-1940) (IV)
Dep. Var.	Log House Value	Log House Value	Log House Value	Log House Value
Covenanted	0.155***	0.127***	0.126***	-0.023
	(0.039)	(0.034)	(0.032)	(0.053)
Time Trend Poly.	Y	Y	Y	N
1940 region Dummy	ED	ED	ED	N
2010 region Dummy	Zip	Zip	Zip	Zip
Housing Characteristics	Y	Y	Y	Y
1940/50 Census Controls	Y	Y	Y	N
2010 Census Controls	Y	Y	Y	Y
Clustered S.E.	Block	Block	Block	Block
Observations	7,363	8,223	4,799	8,219
R-sqr	0.80	0.79	0.79	0.769

This table presents the IV results from the fuzzy RD design with log house values (2018) as a y-variable with cut-offs restricted to 1946-1950 (model II) and 1947-1949 (model III). Model I is a "Donut" RD with years 1945-1947 and 1950-1951 and Model IV presents placebo RD for 1931-1940 with placebo cut-off at 1935. The main explanatory variable is a dummy for being covenanted. The instrument is a dummy for a house being built before the RD cut-off point of 1948 (Dummy Built 1949). The time trend is a 2nd-degree polynomial. The 2010 fixed effects are at zip code level. The individual house characteristics are parcel area (in square feet), number of bedrooms, fireplaces, and bathrooms. The 2010 census control variables are census block population, share of people above 18, and share of white residents at block level, and median household income at census tract level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block level. The data comes from census (1940, 1950, 2010), ACS (2010), Hennepin county tax assessor data, and the Mapping Prejudice project.

Figure 5: House Characteristics over Time [1945-1951]

95% confidence intervals
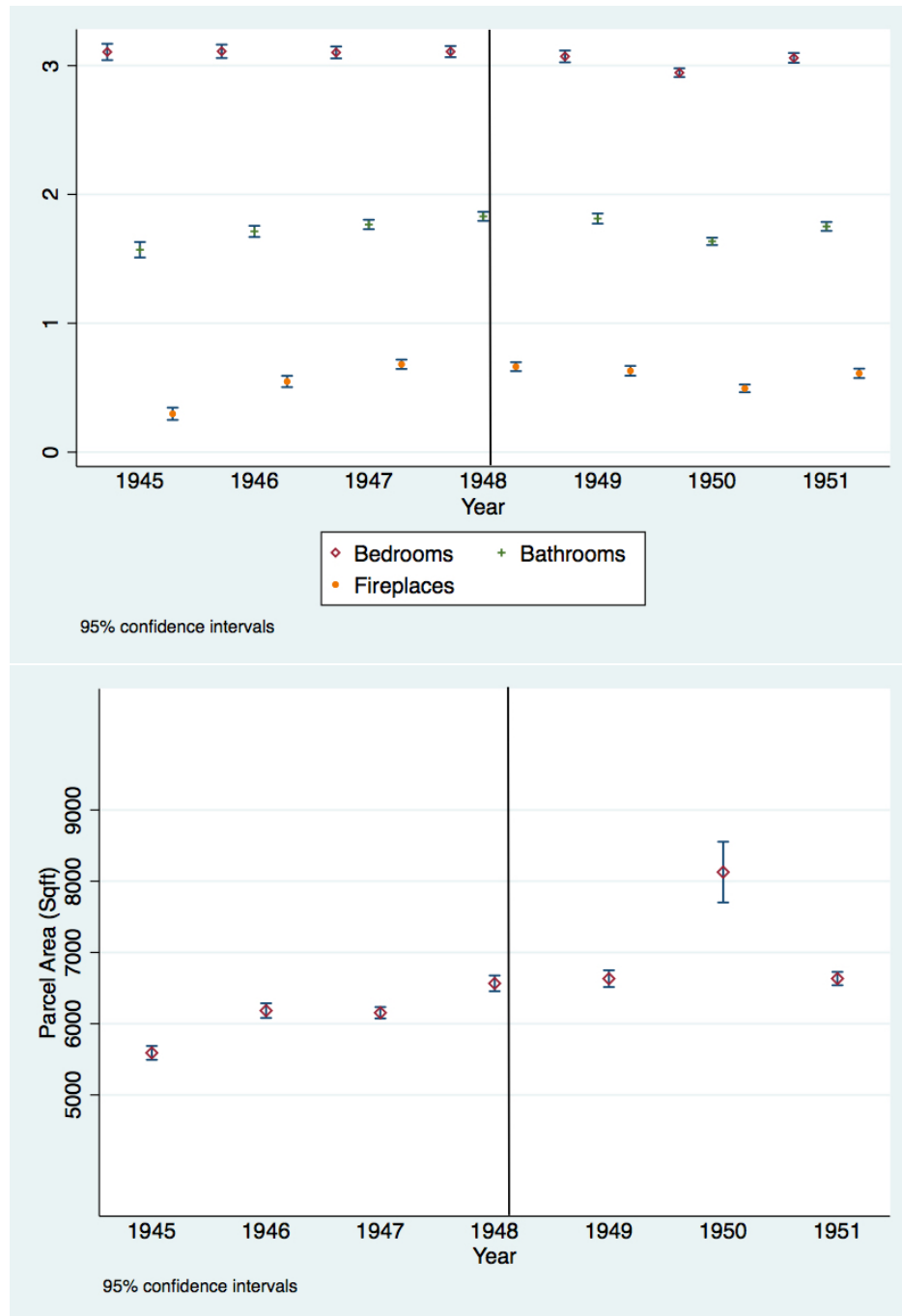
Note: This figure presents the mean and 95% confidence interval of home char-
acteristics from 1945-1951. Characteristics are number of bedrooms, bathrooms,
fireplaces, and house parcel area in square feet. Data is from Mapping Prejudice.
In 1948, the Supreme Court rules that covenants are not legally enforceable.

specifications by allowing for linear and higher order polynomials. Change in time trend polynomial does not result in any significant changes in our results. It can be seen from Model III in **Table 3**, our results are robust when we exclude the year 1950. Model IV in **Table 3** presents results placebo RD design at a different time period between 1931-1940 with cut-off point randomly selected at 1935. We unable to test for another geographic location since covenants data is not available for any other location. We also avoid testing at 1941-1944 so as to not confound our results with effects of the Second World War. Analysing data between 1931-1940, we find no statistically significant relation between covenants and present-day house valuations. This also is true if we randomly select 1933 or 1937 as a cut-off point. We also test for a smaller 2010 regional dummy in which we include in **Appendix D.2**. In narrower bands of our regional dummy, we see the effects of covenants tend to decline. We believe that this is evidence that covenants are exerting a positive externality on its immediate neighbors and prices are reflecting these neighborhood prices.

5   Discussion on Mechanisms of Persistent Effects

In this section, we discuss several possible mechanisms which may explain the reason for the long-run effects of housing covenants after 70 years. While we are agnostic per the exact mechanism which generates these effects, we hypothesize and provide evidence that the long-run persistent effect of covenants manifests through three different mechanisms: 1) private investment and home quality; 2) public investment; 3) preference externalities.

5.1   Private Investment and House Quality

The first channel is through differences in private investments of covenanted and non-covenanted lots. Given that the prices of homes in covenanted neighborhoods were higher than that of an identical home in a non-covenanted neighborhood, then home-owners may be more willing to continue to invest to maintain the quality of their home in a "nicer neighborhood." Our RD approach assumes that there is a fixed cost of investment–at least in the short-run–and build quality in home construction is inelastic to the Supreme Court ruling. Another possibility is for homes to have quality differences arising because of changes in

unobservable build quality immediately after the Supreme Court ruling. For example, developers may begin using a lower quality windows or insulation because they may not be able to sell the homes as high as they anticipated. We plot mean and 95% confidence intervals of various house level characteristics before and after the 1948 ruling (see **Figure 5**). Characteristics like bedrooms, bathrooms, and fireplaces do not significantly change between 1945 and 1951 or around the cut-off date. Parcel area also remains roughly constant during this time period with the exception of 1950. Moreover, changes to lower quality materials does not change our underlying argument: covenanted homes which excluded people of color from living in them garner higher home prices today.

5.2 Public Investment

An alternative mechanism which may propagate differences in house prices over time is from public investment. Once neighborhoods had their initial conditions established, over the next several decades there could be disparities in investment of infrastructure, recreational, and public works between areas covenanted and non-covenanted areas. Because covenanted homes were purchased by more affluent and hence, politically more powerful groups, they could direct public policy in their favor. The development of parks and greenways nearby work to increase the local home values. In **Figure 6**, we discuss how highway development avoided covenanted areas in the 1950s. Similarly, covenanted areas also had access to cheaper credit from "redlining" of HOLC maps. See **Appendix E.1** for discussion on the role of HOLC maps. Public investment may explain differences in home prices across larger geographical areas, but homes within a narrower proximity with each other should not see differences in house prices resulting from these characteristics.

5.3 Preference Externality

The third channel is through a positive preference externality whereby covenants discourage dissimilar people from agglomerating. Analogously, covenants encouraged similar types of people to live in closer proximity with each other. Residents will prefer to consume similar local private as their neighbors Waldfogel (2008). Hence, similar demand in a neighborhood

Figure 6: African-American Population and Highway Location
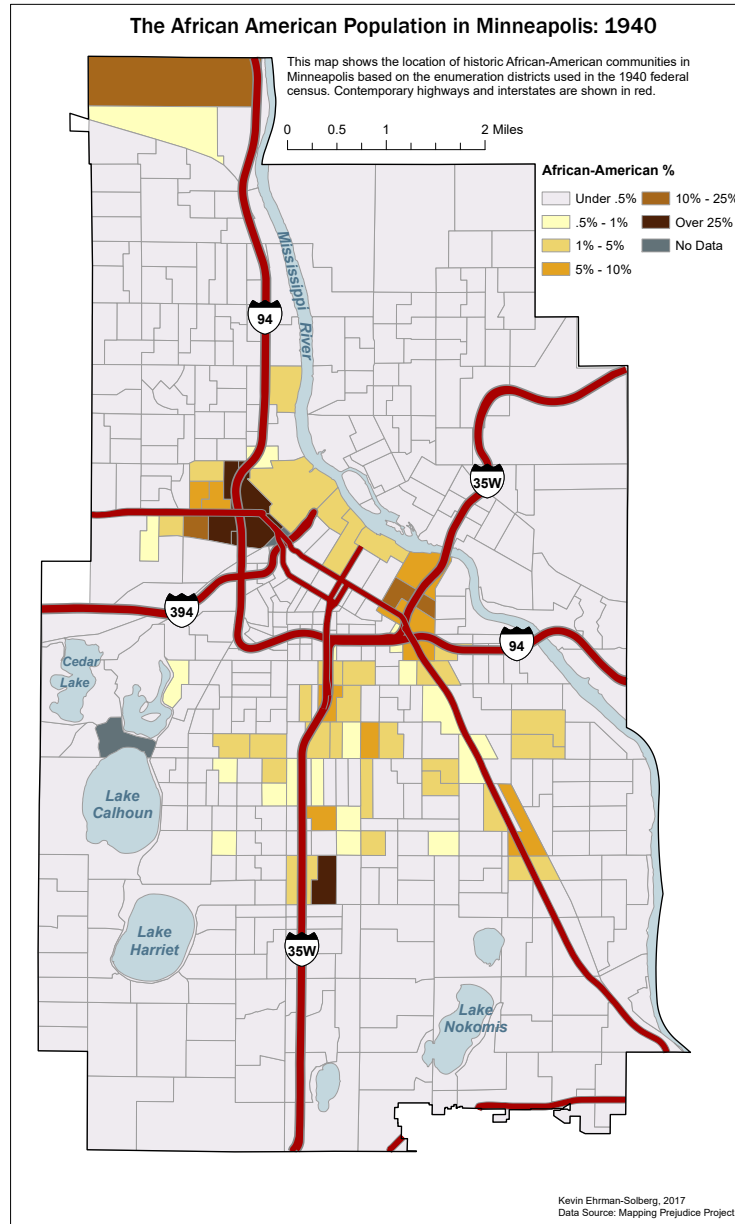
Note: This figure plots the African-American population in 1940 in Minneapolis and highway locations. The development of highways in the 1950s intentionally avoided areas where covenants were located. Instead, they cut through several areas where there were concentrations of African-American populations in the 1940s. The data comes from the Mapping Prejudice project.

will have higher demand and hence a higher price because this complementarity. Because home prices are a function of both local amenities, private and public, as well as house characteristics, then the initial condition of a neighborhood can have long-run effects on home prices. This coupled with house market frictions can lead to persistent effects of covenants.

In the next subsections, we investigate this possibility by showing the racial make-up of neighborhoods are highly persistent and reflect much of the 1940s and 1950s demographics of the enumeration districts they belonged in.

5.3.1 Empirical Model: Census Block Level

In addition to estimating the effect of historic covenants on present-day house valuations, we also investigate covenants' effects on percent of non-white residents, percent of non-white home ownership and percent of non-white renting rates at census block level. We include only black residents and both black and other non-white residents in our analysis. Like the previous section, we model fuzzy RD design as a 2SLS IV approach. The empirical model at census block level i is given as:

$$Y_{it} = \alpha_0 + \alpha_1 \%\text{cov}_{is} + \beta_1 X_{it} + \theta \eta_i + \epsilon_{it} \tag{3}$$

$$\%\text{cov}_{is} = \gamma_0 + \gamma_1 \%\text{built}_{is} + f(Date_s) + \beta_1 X_{es} + +\eta_e \epsilon_{es} \tag{4}$$

where Y_{it} is the percent of minority population, percent of minority home ownership, and percent of minority renting rates at census block level at time $t = 2010$. $\%\text{cov}_i$ is the share of lots that were covenanted within the 2010 census blocks i. X_i: are census block and tract level controls and s is time period 1945-1951 (or a smaller time window within). $\%\text{built}_{is}$ is the share of houses within block i that were built right before the 1948 cutoff point. **Figure 7** shows the relationship between the our main variable of interest ($\%\text{cov}_i$) and the instrument ($\%\text{built}_{is}$). e is a census enumeration district and eta_e captures the enumeration district dummy effects.

For these models, the dependent variables are percent. We also transform these variables using the inverse hyperbolic sine (or arcsinh) transformation to to approximate a normal

Figure 7: Share of Census Block Built and Covenanted before 1948
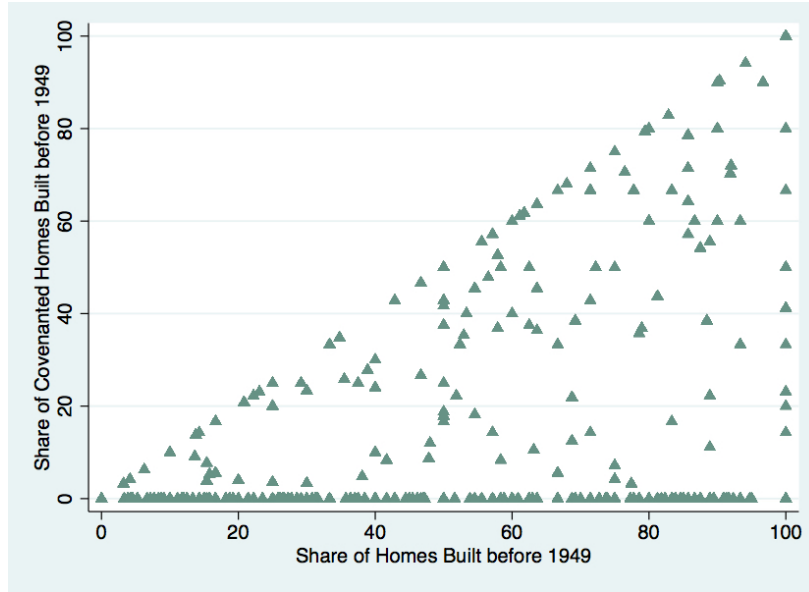
Note: This figure consider all home built between 1945-1951. It plots the share of homes built before 1949 against share of home covenanted and built before 1949. *Source: Mapping Prejudice Project*

distribution and to reduce the effect of outliers. This transformation is preferable to the logarithm transformation as taking logarithm would drop zero-valued observations. It also has the added advantage whereby going from zero to one will have a substantially significant effect on the outcome variables. The results section presents results using arcsinh dependent variables. Appendix D presents the results from the model with percentages as dependent variables. While the arcsinh doesn't change the sign of significant variables, the magnitudes do differ in the transformed and un-transformed variables. See Section 6.2 for more discussion on this.

5.3.2 Segregation Results

This section presents results on the time-persistent effect of the covenants on the racial spatial structure of Minneapolis by studying the effects of covenants on census block level. For this analysis, we only consider home built between 1945 and 1951, both years inclusive. **Figure 7** graphically presents the first-stage of our analysis, plotting share of houses built within a census block between 1945-1948 out of all homes built between 1945-1951 against

Table 4: RD Results at Block Level: Covenants and Home Ownership Rates

Dependent Var.	Arcsin % Covenanted (I) First-Stage	Arcsin % ownership (II) All races	Arcsin % ownership (III) Black	Arcsin % ownership (IV) Non-white
Arcsin % homes		-0.025	-0.189***	0.086
covenanted		(0.018)	(0.058)	(0.069)
Percent of homes	0.006***			
built <= 1948	(0.000)			
1940 Region Dummy	ED	ED	ED	ED
2010 Region Dummy	Y	Y	Y	Y
1940/50 Census controls	Y	Y	Y	Y
2010 Census Controls	N	Y	Y	Y
Clustered SE	ED	Block	Block	Block
Observations	1,782	1,772	1,772	1,772
R-sqr	0.232	0.699	0.601	0.570

This table presents the first-stage and IV results from the fuzzy RD design with arcsinh percentage of home ownership across races as dependent variables. The analysis is restricted to homes built 1945-1951. The main explanatory variable is the percentage of census block built 1945-1948 and covenanted. The instrument is the percentage of census block built 1945-1948. The 2010 census control variables are census block population, share of white residents , share of vacant houses at block level, and median household income at census tract level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block group level. The data comes from census (1940, 1950, 2010), ACS (2010), and the Mapping Prejudice project.

Table 5: RD Results at Block Level: Covenants, Renting, and Population by Race

Dependent Var.	Arcsin % population (I) Black	Arcsin % population (II) Non-white	Arcsin % rental (III) Black	Arcsin % rental (IV) Non-white
Arcsin % of homes	-0.140*	-0.055	0.035	-0.096
covenanted	(0.077)	(0.060)	(0.133)	(0.147)
1940 Region Dummy	ED	ED	ED	ED
2010 Region Dummy	Tract	Tract	Tract	Tract
1940/50 Census controls	Y	Y	Y	Y
2010 Census Controls	N	Y	Y	Y
Clustered SE	Block	Block	Block	Block
Observations	1,772	1,772	1,545	1,545
R-sqr	0.605	0.558	0.520	0.498

This table presents the IV results from the fuzzy RD design with arcsinh percentage of renting across races and arcsinh percentage of minority population as dependent variables. The analysis is restricted to homes built 1945-1951. The main explanatory variable is the percentage of census block built 1945-1948 and covenanted. The instrument is the percentage of census block built 1945-1948. The 2010 census control variables are census block population, share of owners , share of vacant houses at block level, and median household income at census tract level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block group level. The data comes from census (1940, 1950, 2010), ACS (2010), and the Mapping Prejudice project.

share of houses built and covenanted within a census block between 1945-1948. As can be seen from the figure, there are many census blocks that had all of their houses built between 1945-1948 covenanted. Model I in **Table 7** presents the first-stage regression results. We find that a 1% increase in percentage of houses built before 1949 in a census block, increases the likelihood of houses covenanted by 0.104%. For this analysis, we use 1940 enumeration district location dummy and also cluster standard errors at this level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. Models II, III, and IV in **Table 7** study effect of covenants on home ownership rates across different races. The dependent variable is inverse hyperbolic sine (or arcsinh) transformation of percent home ownership. There is no statistically significant effect between home ownership rates and percent of block being covenanted if we consider ownership rates across all races or the non-white population (includes all races that are not white). However, as can be seen in Model III, we find a statistically significant coefficient of -0.045 between percent of homes covenanted and black home ownership. Calculating the arcsinh elasticity at the means, we find that a 1% increase in covenanted houses within a block, reduces the black home ownership rates by 19%.

Additionally, as can be seen in Model I in **Table 4** we find a statistically significant coefficient of -0.047 between percent of homes covenanted and black residents within a block. Calculating the arcsinh elasticity at the means, we find that a 1% increase in covenanted houses within a block, reduces the black resident rates by 19%. We do not find statistically significant relationship between non-white resident population and larger share of blocks being covenanted (Model II). We also do not find statistically significant relationship between renting rates of minorities and larger share of blocks being covenanted. While results in **Tables 4 and 5** are with transformed arcsinh dependent variable, see **Tables 7 and 8** in **Appendix D.4** for untransformed dependent variable in percentages. The sign and the statistical significance does not change with the transformation, but the magnitude of the effects varies slightly.

These results are indicative of the fact that most racial covenants specifically prevented African-American families from buying or renting these houses. They are also indicative of the fact the most non-black minorities moved into Minneapolis much after covenants

were made unenforceable. Thus, the time-persistent effects are seen more starkly among the African-American population whose initial settlement took place around the time racial covenants were legally enforceable.

6   Conclusion

In this paper, we document the effects of racially-restrictive housing covenants on present day outcomes such as current house valuations, racial segregation, and home ownership by African-Americans. We use a unique and newly constructed data which analyzes all historic sales deeds in Minneapolis and identifies lots that used racially restrictive covenants. After mapping these covenanted lots to present-day geography of Minneapolis and using regression discontinuity design around the unanticipated 1948 Supreme Court ruling that made racially-restrictive covenants unenforceable, we document that racial covenants have had time-persistent effects and have significantly affected the socioeconomic geography of Minneapolis. In particular, we document that houses that were covenanted have on average 15% higher present-day house values compared to houses that were not covenanted. We also find that census blocks with larger share of covenanted lots have smaller black population and lower black home ownership rates. Our results are consistent with theory that racially-restrictive covenants were effective in keeping middle-class African Americans and other minorities from buying houses in certain middle-class neighborhoods.

While we find large effects of the a historic racial housing policy on present-day outcomes, the current research cannot shed light on policies to alleviate the inequality created by racial covenants. Further research is required to provide policy proposals to mitigate the time-persistent effects of racial covenants. However, our current research sheds light on the existence of these persistent effects. Subsequent studies could examine how covenants effected the neighborhoods and house ownership non-white non-black residents and religious groups. Additionally, our current analysis uses regression discontinuity design to causally study the effect of racial covenants. Given the study design of this paper, the results show the local effect near the boundary of the 1948 decision which may not extend away from the boundary. We expect a non-parametric approach which matches similar lots near each other

would help us understand the effects of covenants a life-time after they fell.
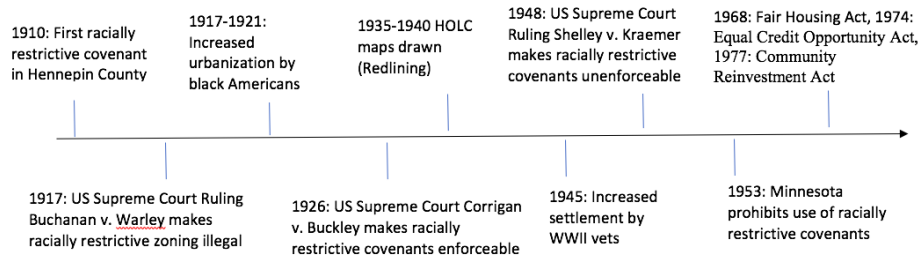
References

Aaronson, D., D. Hartley, and B. Mazumder (2018). The short-and long-run effects of the 1930s holc" redlining" maps. In *Journal of Economic History*, Volume 78, pp. 620–620. Cambridge University Press 32 Avenue of the Americas, New York, NY 10013-2473 USA.

Acemoglu, D., S. Johnson, and J. A. Robinson (2001, December). The colonial origins of comparative development: An empirical investigation. *American Economic Review 91*(5), 1369–1401.

Ahlfeldt, G. M., S. J. Redding, D. M. Sturm, and N. Wolf (2015). The economics of density: Evidence from the berlin wall. Volume 83, pp. 2127–2189.

Allen, M. T., G. W. Austin, and M. Swaleheen (2015). Measuring highway impacts on house prices using spatial regression. In *Journal of Sustainable Real Estate*, Volume 7, pp. 83–98. American Real Estate Society.

Angrist, J. D. and J.-S. Pischke (2008). *Mostly harmless econometrics: An empiricist's companion.* Princeton university press.

Appel, I. and J. Nickerson (2016). Pockets of poverty: The long-term effects of redlining. In *SSRN*.

Black, S. E. and P. E. Strahan. Entrepreneurship and bank credit availability. *The Journal of Finance 57*(6), 2807–2833.

Brinkman, J. and J. Lin (2019). Freeways revolt! In *Working Paper*.

Brown, A. R. and V. Smith (2016). *Race and real estate.* Oxford University Press, USA.

Cameron, S. and C. Taber (2004). Estimation of educational borrowing constraints using returns to schooling. *Journal of Political Economy 112*(1), 132–182.

Carroll, C. (2001, 06). A theory of the consumption function, with and without liquidity constraints. *Journal of Economic Perspectives 15*, 23–45.

Chetty, R., J. N. Friedman, N. Hendren, M. R. Jones, and S. R. Porter (2018). The opportunity atlas: Mapping the childhood roots of social mobility. Technical report, National Bureau of Economic Research.

Chetty, R. and N. Hendren (2018a, 02). The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects*. Volume 133, pp. 1107–1162.

Chetty, R. and N. Hendren (2018b, 02). The Impacts of Neighborhoods on Intergenerational Mobility II: County-Level Estimates*. *The Quarterly Journal of Economics 133*(3), 1163–1228.

Connerly, C. E. (2002). From racial zoning to community empowerment: The interstate highway system and the african american community in birmingham, alabama. *Journal of Planning Education and Research 22*(2), 99–114.

David, P. A. (1985). Clio and the economics of qwerty. Volume 75, pp. 332–337. American Economic Association.

Duranton, G. and D. Puga (2003, 09). *Micro-Foundations of Urban Agglomeration Economies*, Volume 4.

Heblich, S., S. Redding, and D. Sturm (2015). The making of the modern metropolis: Evidence from london. Volume 83, pp. 2127–2189.

Jones-Correa, M. (2000). The origins and diffusion of racial restrictive covenants. *Political Science Quarterly 115*(4), 541–568.

Kaul, G. (2019, Feb). With covenants, racism was written into minneapolis housing. the scars are still visible.

Krimmel, J. (2017). Persistence of prejudice: Estimating the long term effects of redlining.

Redding, S. J. and D. M. Sturm (2008, December). The costs of remoteness: Evidence from german division and reunification. Volume 98, pp. 1766–97.

Rosenthal, S. and W. Strange (2004). Evidence on the nature and sources of agglomeration economies. In J. V. Henderson and J. F. Thisse (Eds.), *Handbook of Regional and Urban Economics* (1 ed.), Volume 4, Chapter 49, pp. 2119–2171. Elsevier.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America.* Liveright Publishing.

Shertzer, A., T. Twinam, and R. P. Walsh (2016, July). Race, ethnicity, and discriminatory zoning. Volume 8, pp. 217–46.

Waldfogel, J. (2008). The median voter and the median consumer: Local private goods and population composition. *Journal of Urban Economics 63*(2), 567–582.

Zenou, Y. and N. Boccard (2000). Racial discrimination and redlining in cities. Volume 48, pp. 260 – 285.

Appendices

A Timeline of Housing Discrimination and Policies

Note: The abolition of covenants pre-date other fair housing policies such as the Fair Housing Act (1968) or the Equal Credit Opportunity Act (1974).

B Sample Racial Covenants

B.1 Sample 1

4. That no building shall be left with paper exposure or with the exterior incomplete.

5. That the said land or buildings thereon shall never be rented, leased or sold, transferred or conveyed to, nor shall same be occupied exclusively by person or persons other than of the Caucasian Race.

6. The forgoing covenant and restriction shall run with the land and shall bind the grantee herein and the heirs, executors, administrators, successors and assigns of said grantee until the first day of January A.D. Nineteen hundred and Forty.

B.2 Sample 2

E. No persons of any race other than the Aryan race shall use or occupy any building or any lot, except that this covenant shall not prevent occupancy by domestic servants of a different race domiciled with an owner or tenant.

F. No trailer, basement, tent, shack, garage, barn or other outbuilding erected in the tract shall at any time be used as a residence temporarily or permanently, nor shall any structure of a temporary character be used as a residence.

B.3 Sample 3

Doc. No. 2278274 , Filed Mar 20 , 1945 , at 12:30 o'clock P. M.

Warranty Deed. Individual to Joint Tenants. Form No. 6. Minnesota Uniform Conveyancing Blanks (1931)

This Indenture, Made this 18th day of November, 1939

between Sheldon Blair and Gladys B. Blair, his wife

of the County of Hennepin and State of Minnesota, parties

of the first part, and Claude Bartlett & Catherine Ruth Bartlett

of the County of Hennepin and State of Minnesota , parties of the second part,

Witnesseth, That the said part of the first part, in consideration of the sum of

One Dollar ($1.00) and other good and valuable consideration DOLLARS,

to them in hand paid by the said parties of the second part, the receipt whereof is hereby acknowledged, do hereby Grant, Bargain, Sell, and Convey unto the said parties of the second part as joint tenants and not as tenants in common, their assigns, the survivor of said parties, and the heirs and assigns of the survivor, Forever, all the tract or parcel of land lying and being in the County of Hennepin and State of Minnesota, described as follows, to-wit:

Lot Fourteen (14), Block Three (3), Blair's Wooddale Third (3rd) Addition. The said covenant shall be subject to the following conditions, to-wit:

(1). That the said land or buildings thereon shall never be rented, leased or sold, transferred or conveyed to, nor shall the same be occupied exclusively by any negro or colored person or person of negro blood.

(2). That no signs for advertising purposes shall be erected or placed thereon.

(3). That all building erected thereon shall be placed or set back not less than twenty-five (25) feet from the street line.

(4). That no building shall be left with paper exposure.

(5). That there shall not be erected upon any portion of said premises any dwelling consting less than Three Thousand ($3,000.00) Dollars.

To Have and to Hold the Same, Together with all the hereditaments and appurtenances thereunto belonging or in anywise appertaining, to the said parties of the second part, their assigns, the survivor of said parties, and the heirs and assigns of the survivor, Forever, the said parties of the second part taking as joint tenants and not as tenants in common.

And the said Sheldon Blair and Gladys B. Blair, his wife

parties of the first part, for themselves, their heirs, executors and administrators do covenant with the said parties of the second part, their assigns, the survivor of said parties, and the heirs and assigns of the survivor, that they are well seized in fee of the lands and premises aforesaid and have good right to sell and convey the same in manner and form aforesaid, and that the same are free from all incumbrances,

And the above bargained and granted lands and premises, in the quiet and peaceable possession of the said parties of the second part, their assigns, the survivor of said parties, and the heirs and assigns of the survivor, against all persons lawfully claiming or to claim the whole or any part thereof, subject to incumbrances, if any, hereinbefore mentioned, the said part of the first part will Warrant and Defend.

In Testimony Whereof, The said parties of the first part have hereunto set their hands the day and year first above written.

In Presence of

Zelphia C. Butze

Vernice T. Walker

Sheldon Blair

Gladys B Blair

State of Minnesota, } ss.

County of Hennepin

(Fifty Cent in)
(Int. Rev. Doc.)
(Stamp Canceled)

On this 24 day of November , 19 39 , before me, a

Notary Public within and for said County, personally appeared

Sheldon Blair and Gladys B. Blair, his wife

to me known to be the persons described in, and who executed the foregoing instrument, and acknowleged that they executed the same as their free act and deed.
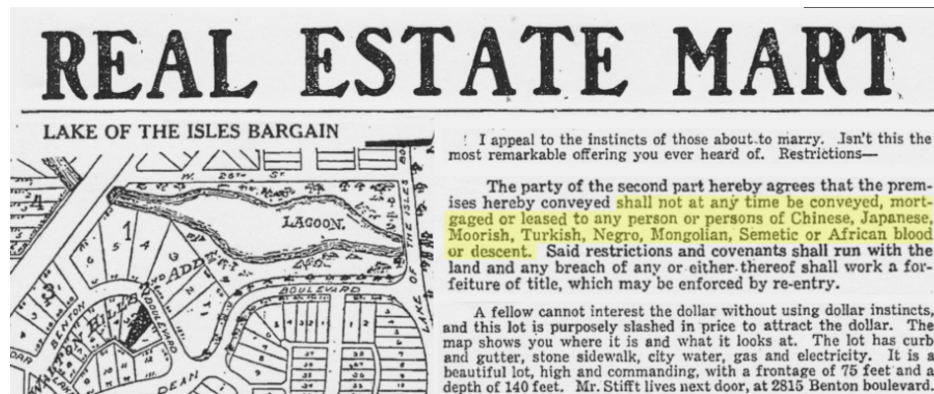
(See Note)

(See Note)

(Notarial Seal)

Vernice T. Walker Vernice T. Walker

Notary Public Hennepin County, Minn.

My Commission expires August 5 , 19 46

NOTE: The blank lines marked "See Note" are for use when the instrument is executed by an attorney in fact.

EE

B.4   Sample 4

C   Mapping Prejudice Data

The MP data is compiled by a team of geographers, historians, and researchers who combed through tens of thousands of property deeds to uncover racial covenants. Every property deed from *1910-1970* in Hennepin County was scanned and digitized using an optical character recognition software (OCR). These OCR documents were then separated into two sets: one where there are definitely not any racial covenants and the remainders. Categorization into the first group is based on the date that the deed was executed (there were no covenants after 1953). Identifying racial covenants in the second group was determined by the crowd-sourcing software Zooniverse. The Zooniverse crowd-sourcing strategy had users go through a training set of racially restricted deeds. After completing the training, users would individually go through each deed identifying whether there was any racial covenant data. Each deed would be reviewed by several users before it was classified as covenanted or not. Once deeds including racial covenants were identified, a geographer would then assign a spatial identifier based on information in the deed. Assignment of a geographical marker is based on the contemporaneous address found in the deed and are updated to reflect the present-day block and lot information. We assume that the number of racial covenants exceeds those of which we identify.

We then combine the MP data with with 2018 tax assessor data from Hennepin County containing not only values of the homes and land, but also housing characteristics such as the number of stories, home square footage, lot size, and so forth. We then limit our analysis to homes which are categorized as single-family detached dwelling, single-family attached dwelling, and multi-family residential, excluding multi-family apartments and commercial real-estate. Per our identification strategy, we restrict our analysis to homes built between 1945-1951 for our empirical strategy. This gives us 994 covenants out of 10,037 extant homes. These homes are then mapped to the 2010 Census block, block group, and tract which we combine with 2010 Census block level information on residents' races (white, Hispanic, black, Asian, etc.). The census information includes population, home ownership rates, and rental rates by race. We complement the census data with the contemporaneous American Community Survey 2010-2014 data on median household income

by race at the block group level.

For historical data, we join our data set with information from the decennial census in 1940, 1950, 1970, and 1980. For the 1940 and 1950 census, the lowest level of available data is the enumeration district, equivalent in size to modern-day census tracts. It should be noted that the classification of enumeration districts from this period is different than the 2010 census tracts, and thus homes within the same 2010 census tract may have fallen into different historical enumeration districts. In contrast, 1970 and 1980 data contains block group level data on the 2010 geographies and avoid this difference. The 1970 census data contain information on white, black, and "other" home ownership, rental rate, income, and population. Whenever variables were described as "Spanish" or "other" there was no overlap between the two so we treat them a single racial group. We impute the average income by race from the 1980 census data using the midpoint of ranges of incomes and the number of families in that range.

D   Robustness Tests

D.1   Tests for Valid Instruments

Tests of endogeneity
Ho: variables are exogenous
Robust regression F(1,1776) = 13.926 (p = 0.0002)
(Adjusted for 1777 Census Blocks Clusters)
Shea's partial R-squared
0.1826

This table presents the valid instruments tests for the IV regressions in **Table 2**. The endogenous variable is a dummy for a covenanted house and the instrument is a dummy for house being built before 1949. The analysis is restricted to 1945-1951. The data comes from census (1940, 1950, 2010), ACS (2010), Hennepin county tax assessor data, and the Mapping Prejudice project.

D.2 House Level Block Group Region

Robustness Tests for Fuzzy RD Results at House-Level Analysis

	RD-IV	RD-IV
	(I)	(II)
Dep. Var.	Log House Value	Log House Value
Covenanted	0.057*	0.025
	(0.032)	(0.022)
Time Trend Poly	Y	Y
1940 region Dummy	ED	ED
2010 region Dummy	Block Group	Block Group
Housing Characteristics	N	Y
1940/50 Census Controls	Y	Y
2010 Census Controls	Y	Y
Clustered S.E.	Block	Block
Observations	10,667	10,662
R-sqr	0.733	0.865

This table presents the IV results from the fuzzy RD design with log house values (2018) as a y-variable with cut-offs restricted to 1945-1951. The main explanatory variable is a dummy for being covenanted. The instrument is a dummy for a house being built before the RD cut-off point of 1948 (Dummy Built 1949). The time trend is a 2nd-degree polynomial. The 2010 fixed effects are at zip code level. The individual house characteristics are parcel area (in square feet), number of bedrooms, fireplaces, bathrooms, roof type, construction type, exterior type, school district, and watershed district. The 2010 census control variables are census block population, share of people above 18, and share of white residents at block level, and median household income at census block group level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block level. The data comes from census (1940, 1950, 2010), ACS (2010), Hennepin county tax assessor data, and the Mapping Prejudice project.

D.3 House Price Results: Robustness

There is a concern that the results presented above can be masking some of the affects of racial assortative sorting and preference for living among people of one's own race. While these factors can and do exist, this section attempts to assuage these concerns by analyzing house sale prices from 1985-1990. In all of our analysis, we only consider newly built houses between 1945-1951. Given that people tend to occupy their new houses for 30-40 years, if we consider data from 1985-1989 which is about 40 years later, we can alleviate some of the issues associated with sorting as non-frequent movement of house owners prevents new home owners from moving in. We focus on 1985-1989, both years inclusive, since we do not have enough sale price data before 1985. After 1989, the effects of sorting can start taking place. We run the following model for our analysis:

$$\log Y_{ijt} = \alpha_0 + \alpha_1 1\{cov_{js}\} + \beta_1 X_{jt} + \beta_2 X_{it} + \theta\eta_i + \xi t_i + \epsilon_{ijt} \tag{5}$$

$$1\{cov_{ejs}\} = \gamma_0 + \gamma_1 1\{pre1949_{ej}\} + f(Date_s) + \beta_2 X_{es} + \eta_e + \epsilon_{ejs} \tag{6}$$

Y_{ijt} is the sale price of a house between 1985-1989. $1cov_j$: Dummy for a house covenanted in s time period 1945-1951 (or a sub-sample of this time period). X_i Census block/tract controls, X_j house characteristics, η_i is neighborhood dummy variable, and t captures sale year time trend. γ_1 captures the probability of a lot being covenanted, given that it was built before the 1948 ruling. e is a census enumeration district and eta_e captures the enumeration district fixed effects. In addition, the linear time trend in the equation above, $f(Date_s)$ is an nth-order polynomial in time, estimated flexibly.

Table 6 presents results of the effect of covenants on house sale prices between 1985 and 1989, where effects of sorting are minimized. The sale price of covenanted lots is 11.27% higher than non-covenanted lots. We recommend treating the results from this model as suggestive rather than accurate measure of the magnitude of the effects of covenants on house sale prices. First, we have few observations (563) in this model and are constrained by frequency and data on house sales during this time period. Second, we use the house characteristics from 2018 assessor data since house characteristics from 1980 assessor data don't exist. Nonetheless, the house characteristics we use are parcel area (in square feet), number of bedrooms, fireplaces, and bathrooms which are unlikely to alter much over time. In-spite of these issues, we find that house values of non-covenanted lots were depressed in the time period where effects of sorting are minimized suggesting significant effect of covenants on house sale prices.

D.4 More Group Level Results

This appendix presents results on the time-persistent effect of the covenants on the racial spatial structure of Minneapolis by studying the effects of covenants on census block level using percentage home ownership

Table 6: Fuzzy RD Results: Individual House Sale Prices (1985-1989)

	RD-IV (1985-1989)
Dep. Var.	Log Sale Prices
Covenanted	0.107***
	(0.052)
Sale Year Dummy	Y
Time Trend Poly.	Y
1940 region Dummy	Y
1980 region Dummy	Zip
Housing Characteristics	Y
1940/50 Census Controls	Y
1980 Census Controls	Y
Clustered S.E.	Block
Observations	563
R-sqr	0.6295

Note: This table presents the IV results from the fuzzy RD design with log sales prices 1985-1989 as a y-variable. The analysis is restricted to houses built 1945-1951. The main explanatory variable is a dummy for being covenanted. The instrument is a dummy for a house being built before the RD cut-off point of 1948 (Dummy Built 1948). The time trend is a 2nd-degree polynomial. The 1940 region dummies are at census enumeration district level, while the 1980 region dummies are at zip code. The individual house characteristics are parcel area (in square feet), number of bedrooms, fireplaces, and bathrooms. The 1980 census control variables are census block population, share of home owners, and share of white residents at block level. For past census controls, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block level or enumeration district level. The data comes from census (1940, 1950, 1980), Hennepin county tax assessor data, and the Mapping Prejudice project.

Table 7: RD Results at Block Level: Covenants and Home Ownership Rates

Dep. Var.	Percent Covenanted First-Stage(I)	Percent ownership (II) All Races	Percent ownership (III) Black	Percent ownership (IV) Non-White
Percent of homes covenanted		-0.028	-0.045**	0.034
		(0.027)	(0.022)	(0.027)
Percent of homes built $\leq$ 1948	0.104***			
	(0.026)			
1940 region Dummy	ED	ED	ED	ED
2010 region Dummy	N	Tract	Tract	Tract
1940/50 Census Controls	Y	Y	Y	Y
2010 Census controls	N	Y	Y	Y
Clustered S.E.	ED	Block group	Block group	Block group
Observations	1,789	1,770	1,770	1,770
R-sqr	0.210	0.643	0.788	0.827

This table presents the first-stage and IV results from the fuzzy RD design with percentage of home ownership across races as dependent variables. The analysis is restricted to homes built 1945-1951. The main explanatory variable is the percentage of census block built 1945-1948 and covenanted. The instrument is the percentage of census block built 1945-1948. The 2010 census control variables are census block population, share of white residents , share of vacant houses at block level, and median household income at census tract level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block group level. The data comes from census (1940, 1950, 2010), ACS (2010), and the Mapping Prejudice project.

Table 8: RD Results at Block Level: Covenants, Renting Rates, and Population by Race

Dep. Var.	Percent Black (I)	Percent Non-White (II)	Percent Renting (III) Black	Percent Renting (IV) Non-White
Percent of homes covenanted	-0.047*	0.059	0.063	0.004
	(0.028)	(0.042)	(0.064)	(0.082)
1940 region Dummy	ED	ED	ED	ED
2010 region Dummy	N	Tract	Tract	Tract
1940/50 Census Controls	Y	Y	Y	Y
2010 Census controls	Y	Y	Y	Y
Clustered S.E.	Block group	Block group	Block group	Block group
Observations	1,770	1,770	1,543	1,543
R-sqr	0.758	0.815	0.535	0.603

This table presents the IV results from the fuzzy RD design with percentage of renting across races and percentage of minority population as dependent variables. The analysis is restricted to homes built between 1945-1951. The main explanatory variable is the percentage of census block built between 1945-1948 and covenanted. The instrument is the percentage of census block built between 1945-1948. The 2010 census control variables are census block population, share of owners , share of vacant houses at block level, and median household income at census tract level. For census controls in first stage, we use median household income (1950), population density (1940), and share white residents (1940) at the enumeration district level. We restrict our analysis to lots that are residential in nature, excluding apartment buildings. Standard errors are clustered at census block group level. The data comes from census (1940, 1950, 2010), ACS (2010), and the Mapping Prejudice project.

rates across different races and percentage of minority residents as a dependent variable. While results in **Tables 7 and 8** are with transformed untransformed dependent variable in percentages, see Section 6.2 with transformed arcsinh dependent variable. Models II, III, and IV in **Table 7** study effect of covenants on home ownership rates across different races. The dependent variable is percent home ownership. There is no statistically significant effect between home ownership rates and percent of block being covenanted if we consider ownership rates across all races or the non-white population (includes all races that are not white). However, as can be seen in Model III, we find a statistically significant coefficient of -0.045 between percent of homes covenanted and black home ownership. This implies that a 1% increase in covenanted houses within a block, reduces the black home ownership rates by 0.045%.

Additionally, as can be seen in Model I in **Table 8** we find a statistically significant coefficient of -0.047 between percent of homes covenanted and black residents within a block. Thus a 1% increase in covenanted houses within a block, reduces the black resident rates by 0.047%. We do not find statistically significant relationship between non-white resident population and larger share of blocks being covenanted (Model II). We also do not find statistically significant relationship between renting rates of minorities and larger share of blocks being covenanted.

E Public Investment

E.1 HOLC and Racial Covenants

The Homeowners' and Loan Corporation (HOLC) effected neighborhood make-up and contributed to persistent racial inequality. These zoning grades are strongly correlated with covenanted and non-covenanted neighborhoods. Covenanted neighborhoods were considered less risky than non-covenanted neighborhoods. Type A: Best (Green) – newer or areas still in demand. Type B: Still Desirable (Blue) – areas expected to remain stable for many years. Type C (Yellow): Definitely Declining – areas in transition. Type D: Hazardous (Red) – older areas considered risky. As can be seen from **Figure 8**, the covenants overlay either green or blue parts of the HOLC map.

E.2 Covenants and other Racial Housing Instruments

Covenants stand in contrast to other forms of housing discrimination because they were determined by private contracts and not part of a government policy. This made covenants more idiosyncratic and spread out across a city. During the Great Depression, the federal government set up the Homeowners' and Loan Corporation (HOLC) to limit the number of foreclosures. The HOLC created a series of maps for over 200 American cities based on neighborhood housing age, vacancy rates, home quality, and other housing characteristics but also the demographic make-up of neighborhoods such as race and immigration status. Areas

Figure 8: Redlining and Racial Covenants
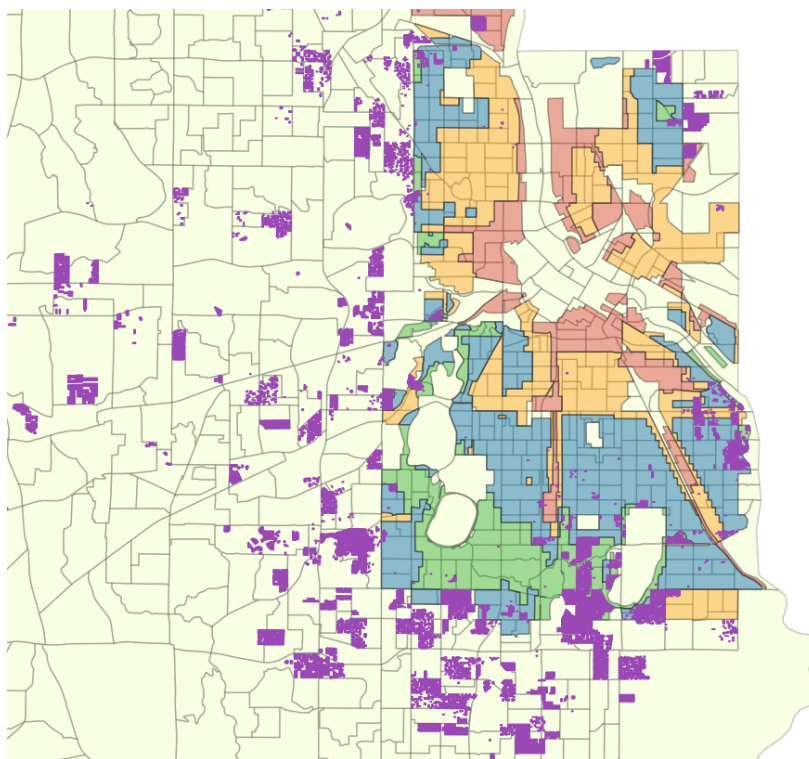
Note: This figure overlays the HOLC map with racial covenants. The racial covenants are in purple. Type A: Best (Green) – newer or areas still in demand. Type B: Still Desirable (Blue) – areas expected to remain stable for many years. Type C (Yellow): Definitely Declining – areas in transition. Type D: Hazardous (Red) – older areas considered risky *Source: Mapping Prejudice Project*

with predominantly African-American population would be rated the lowest making access to credit harder for these residents. The prevalence of covenants and racial demographics of neighborhoods were direct determinants in establishing HOLC maps used to assess different neighborhoods for credit ratings. **Appendix E.1** shows a map of Minneapolis' credit rating where covenanted homes are consistently in neighborhoods with higher credit ratings. The federal, state, and local governments also based zoning projects, highway construction, and affordable housing on the racial backgrounds of neighborhoods. Construction of the interstate highway system, for example, disproportionately targeted black communities throughout the United States (see Connerly (2002)).