

# Long Shadow of Racial Discrimination: Evidence from Housing Racial Covenants\*

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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 and its suburbs. In particular, we document that houses that were covenanted have on average 3.4% 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%.

*Keywords:* Housing Discrimination, Racial Covenants, House Prices, Segregation

*JEL:* N32, N92, R12, R52

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# 1. Introduction

What are the long-term effects of historic racial discriminatory policies on socioeconomic outcomes within cities today? This paper studies this question 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 segregation in Minneapolis and its suburbs. 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 3.4% 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<sup>1</sup>. One of the instruments prevalent in cities in the northern U.S. during the early-mid 20th century in was racial covenants. Starting in the decade before World War I, real estate developers platted neighborhoods and decided whether to added racially-restrictive covenants to these lots. Because a single developer would build swaths of houses together, covenants legally prevented people of color from moving 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 ge-

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<sup>1</sup>See **Appendix A** for a timeline of these events.

ographic amenities. Even after covenants became unenforceable in 1948, covenanted properties saw relatively higher public investment near them (e.g. new lakes or greater distance from highways). Similar to the role portages or QWERTY keyboard played in path dependence, covenants played a similar role for Minneapolis and its suburbs by providing initial conditions around which the socio-economic geography of the city grew (see Bleakley and Lin (2012) David (1985), Henderson et al. (2018), and Acemoglu et al. (2001)). While covenants were prevalent throughout northern cities in the U.S. like New York, D.C. San Francisco, Chicago, Boston, there are two distinct advantages to studying the role of racial covenants in Minneapolis and its suburbs. First, the census of lot level data on racial covenants exists only Hennepin county. Second and more importantly, unlike older cities near the coast which had racially-restrictive zoning or other instruments of housing discrimination, Minneapolis and its suburbs did not. In a newly expanding city during the first half of the 20th century, racial covenants were the first housing discriminatory policy to be used on a large-scale and created initial conditions around which socio-economic spatial disparities built.

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))<sup>2</sup>. Using 1948 as a cut-off point and a fuzzy regression discontinuity design, we compare the present-day outcomes of houses and neighborhoods close to each other 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 7% higher 2018 house

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<sup>2</sup>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.

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<sup>3</sup>. The covenanted property deeds were used mostly used in locations that were less coveted and could not keep people of color out through the price mechanism, effectively keeping lower-middle and middle-class African-Americans and other minorities from buying houses in certain white blue-collar neighborhoods (see Rothstein (2017)). Covenants were also an instrument for developers to create a new permanent “amenity” into areas without true natural amenities and charge higher prices. As Lee and Lin (2018) highlight in their paper, areas with superior natural amenities are better anchored to high incomes over time and can explain the persistence behind differences in house prices. 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.

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 likely higher relative to non-covenanted neighborhoods. Third, residents prefer to consume similar local private goods as their neighbors and hence, choose to live in areas with residents of similar preferences. Consumption complementarity

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<sup>3</sup>Residents in these areas often employed other tools such as private investigators or buybacks to prevent affluent black families from moving in.



and preference externality among residents generate higher home prices that persist in the long-run (Waldfogel, 1999).

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. Economists have long studied the importance of an economy's initial conditions and its 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<sup>4</sup>.

However, Fishback et al. (2020) highlight in their paper, that majority of Black households were redlined because of decades of historic discrimination and that HOLC maps can explain at most a small fraction of the observed concentration of Black households in redlined areas. Similarly, poorer and minority neighborhoods are typically zoned for new construction projects such as freeways to detriment of local residents (see Baum-Snow (2007) 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. 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 Hennepin county. In [Section 2](#) we describes the use and history of racially restrictive covenants, while [Section 3](#) discusses our newly constructed data set using the original property deeds as well as additional sources. [Section 4](#) discusses our empirical strategy. Section 5 discusses possible mechanisms for persistence.

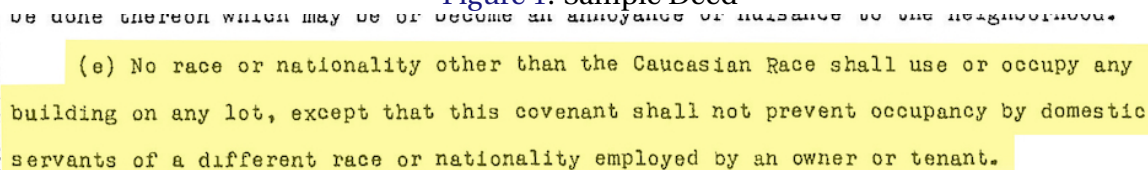
## 2. Background to Racial Covenants

In Minneapolis, Minnesota, the first racially-restrictive deeds appeared in 1910. Soon thereafter, real estate companies began including the language within property deeds

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<sup>4</sup>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 (2002)), or consumption (Carroll (2001)).

Figure 1: Sample Deed



be done thereon which may be or become an annoyance or nuisance to the neighborhood.

(e) No race or nationality other than the Caucasian Race shall use or occupy any building on any lot, except that this covenant shall not prevent occupancy by domestic servants of a different race or nationality employed by an owner or tenant.

(f) No building shall be erected, kept, altered, repaired, kept or other out buildings erected on

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

sold throughout the region. Outside Minnesota, 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 compelling many to migrate out of the most violent regions. In response to these events, 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 at the point of sale included language which either explicitly prohibited many racial and ethnic groups from ever purchasing or residing in a home<sup>5</sup>. 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 <sup>6</sup>.

The Supreme Court reaffirmed the legality and enforceability 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 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 that the use of covenants as part of its “code of ethics.” While it was possible for an individual realtor to not 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)).

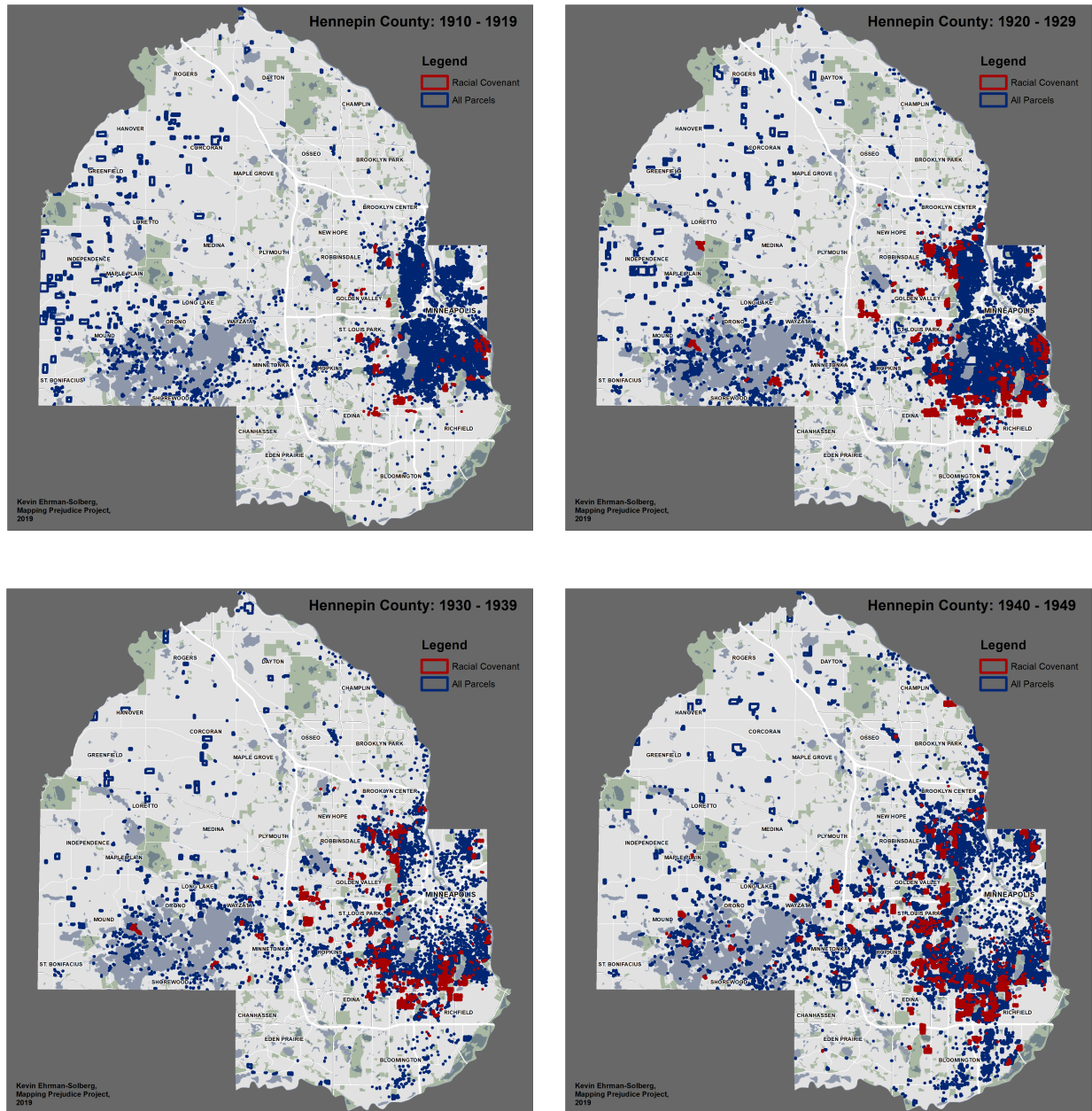
Developers would often advertise the use of covenants as part of their amenities in order to attract buyers and higher prices. Minneapolis and Hennepin County’s urbanization occurred concomitantly with this national trend. Many real estate devel-

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<sup>5</sup>Exceptions were allowed for domestic servants.

<sup>6</sup>For more samples see **Appendix B**.

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



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

opers 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 away from one part of the region into select 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 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 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.

### **3. Data**

Our analysis uses the Mapping Prejudice racial covenants (MP) data, Hennepin County tax assessor data, Hennepin county mortgage data, and the Census Bureau Decennial

Survey from 1940, 1950, and 2010, and the American Community Survey from 2010. We also account for local geographical amenities using the School Attendance Boundary Survey (SABS) from the National Center for Education Statistics (NCES), National Highway Planning Network (NHPN) from the Federal Highway Administration (FHWA), and local bodies of water from the Minnesota geospatial commons.

### **3.1 Mapping Prejudice Data**

The MP data comes from the Mapping Prejudice Project.<sup>7</sup> This is a newly constructed data set using the original sale deeds of all property sales that occurred between 1910 and 1955. These are approximately 30,000 property deeds with 14,634 present-day houses with racial covenants in Hennepin county. Each deed had information on the date executed, the date of the deed, the parties in the transaction, and a geographical identifier. Unfortunately, the deed information lacks the original price of sale because parties would not disclose them in their original filings to avoid property taxes. This practice continued until the 1970s when the Minnesota government began to crack down on the tax avoidance.. See **Appendix C** for more information on the MP data.

41% of covenanted land has a house built on it within 1 year. 51.7% of covenanted land has a house built on it after 1 year and before 1950. These covenants were added by real-estate developers onto farmland converted into new houses in rapidly urbanizing Minneapolis. 6.9% of already built houses have retro-actively added covenants with their sale deeds i.e. individual sellers/homeowners added covenants. For our main analysis we focus on houses/lots constructed between 1945-51. Of the 22,776 extant houses constructed in this period, with 5849 (25%) were covenanted at some point.

### **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, assessor valuation, geo-spatial location, and lot size. For our main analysis of houses/lots constructed between 1945-52. The mean home value

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<sup>7</sup>See their website for more details <https://www.mappingprejudice.org>



Table 1: Summary Statistics

	Non-covenanted	Covenanted
Total Home Value	274,164 (151,350)	293,503 (163,801)
Parcel Sq. Ft.	8,633 (10,712)	8,425.53 (4,402)
Building Area Sq. Ft.	1,180.89 (861.48)	1,226.49 (413.77)
Bedrooms	2.99 (0.80)	3.07 (0.80)
Bathrooms	1.47 (0.66)	1.49 (0.65)
2010 Med. HH Income	86,551 (32,255)	95,796 (34,137)
2010 Share 18+	0.78 (0.08)	0.77 (0.08)
2010 Share White	0.82 (0.17)	0.87 (0.12)
2010 Population	62.96 (63.99)	62.71 (53.34)
Share of Total	89.15%	10.84%
Observations	22,022	2,678

Note: This tables summary statistics. The variables House Value and Year Built are from Hennepin County Tax Assessor data for homes built between 1945 and 1952. Housing characteristics is from ZTrax. House Value is for 2018. Variables on income is from 2010 Census and the share of races is from 2010-2014 ACS estimates. Standard deviation in parenthesis.

over this period is \$276,237 and was built in 1949 (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 ZTRAX Data

Complementing our assessor data, we use the ZTRAX: Zillow Transaction and Assessment Database (Zillow (2021)). This data includes the housing characteristics missing from our assessor’s office such as the number of bedrooms, bathrooms, number of stories, and building square footage. We match the data with the Assessor Property Number (APN) that uniquely identifies properties across data sets.

### 3.4 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**.

#### **3.4.1 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 using the digitized map of 1940 census 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 of 1940 and 1950 for the city of Minneapolis, Edina, St. Louis Park, Robinsdale, Richfield, and Hopkins. This gives us coverage for roughly 92% of all covenanted houses in Hennepin county. At this point, our analysis does not contain data from the remainder of Hennepin county.

### **3.5 Historic Mortgage and 1940 Federal Census Data**

We manually collect the mortgage documents for randomly selected 2,000 properties without replacement, of which we are able to get mortgage documents for 1,709 houses (6.91% of all observations). This data gives us the the mortgage terms including borrowed amount, interest rate, and length of mortgage, names of mortgages as well as information on the type of mortgage—conventional, Veteran Affairs (G.I. Bill), or Federal Housing Authority (FHA). Using the information on loan type, we are able to impute house sale prices for 1,709 houses that were built and sold 1945-1951.

Included in the historical mortgage documents are the borrowers' names often with



the middle initial. For many, the borrowers' ages at purchase were also included and was used to determine an approximate birth years. The approximate birth years were estimated  $\pm 3$  years from the date of the mortgage transaction less the age listed when available. From there, we manually link the male name to the 1940 Federal Census from Ancestry (2021).

Two match-types were possible on our search: unique match and candidate matches. To determine a unique match, we begin with just the male individual's first and last name. If the 1940 Census recorded the middle name or initial for all the possible results and it was available in the mortgage documents, we would use that to winnow the set of candidates. If further filtering is required due to multiple individuals having the same name, we narrow the search using the inferred birth year  $\pm 3$  years (if available) and then/or the second name on the mortgage. Naturally, not all names were uniquely matched and we would have candidate matches. Many individuals who purchased homes between 1945-1951 were still children or unmarried in the 1940 Federal Census. Because our ultimate goal is to infer the race of the borrower, we can still reasonably do so when there were multiple candidates with the same name and we cannot reduce the set further based on the information in the mortgage documents. In these cases, we still infer the race of the individual based on the set of candidates who shared the name. **Table 2** summarizes the difference racial breakdowns of homes covenanted and not covenanted before and after 1949.

**Table 2:** Racial Composition and Loan Type of Home Purchases 1945-1951

Time Period	White	Black	Other	Black Conventional	Black FHA	Black VA
Pre-1949 Covenanted	224	1*	1	0	1	0
Pre-1949 Non-Covenanted	434	3	0	2	0	1
Homes Built 1949-51	1031	14	1	4	5	5

**Note:** Historic mortgage data and 1940 Federal Census linked with Mapping Prejudice data. 1\* references an observation which had two individuals with identical names in the United States. One individual was white in Illinois and the other was black in Georgia.

### **3.6 School Attendance Zones, Highways, and Local Water**

Three of the most important local amenities are the quality of schools, the distance from highways, and the distance from local bodies of water. For each home, we identify all the elementary schools that are available to the household. When a household may attend multiple schools, we keep the schools which offer the highest grade. When there are multiple schools which offer the same highest grade (e.g. fifth grade), we keep the schools which offer the lowest grade (e.g. kindergarten). If there still are multiple schools available to the household, we classify the set of schools to be unique. This gives us 48 different combination of elementary schools available to a household in our sample. We then calculate the linear distance from the center of a home's parcel to the nearest highway and river or lake.

## **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<sup>8</sup>. 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

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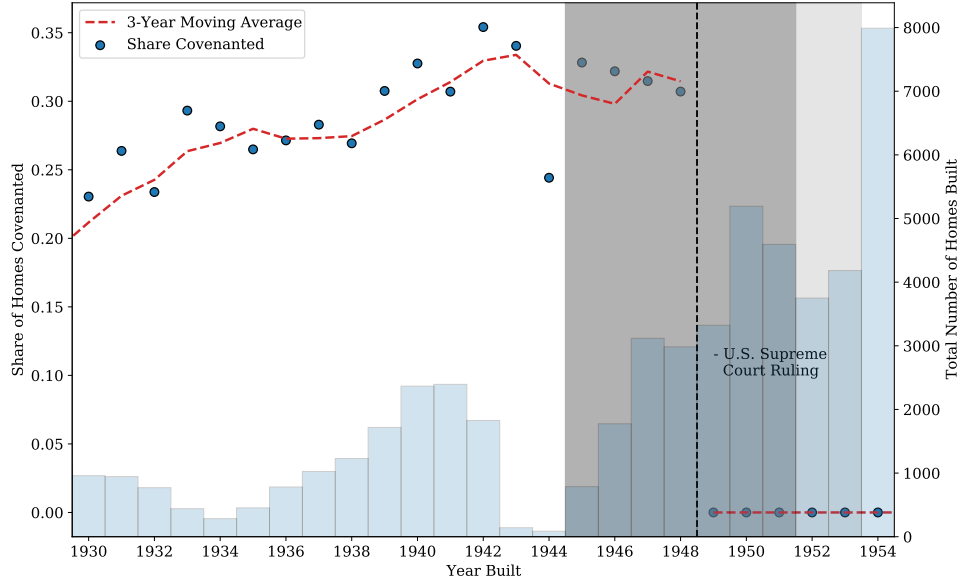
<sup>8</sup>Note that the independent variable is not whether a land deed has covenant attached to it but whether the covenant had any legal standing. This is applicable for 99% of new deeds we observe in the time frame between 1945-1951.

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 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 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 E.2**, 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 3** 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 af-

**Figure 3: 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.

ter 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 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:

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

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

where  $\mathbb{1}cov_{js}$  is dummy for a house covenanted in  $s$  time period 1945-1951 (or a subsample of this time period).  $X_{it}$  are census block/tract controls,  $X_{jt}$  are house characteristics, and  $\eta_i$  captures neighborhood dummy effects.  $\gamma_1$  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  $\eta_e$  captures the enumeration district dummy effects. In addition to the linear time trend in the equation above,  $f(Date_s)$  is an  $n$ th-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 Present-Day House Price Results

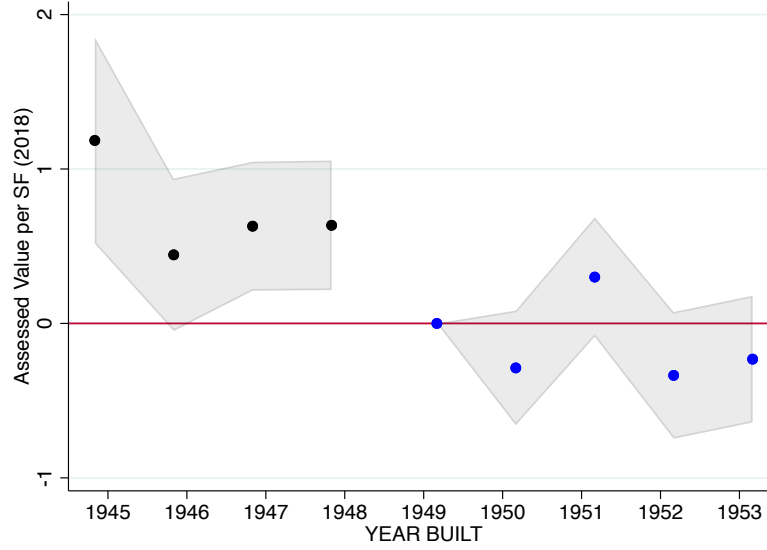
The results of time-persistent effects of covenants on present-day house prices are presented in **Table 3** and **Figure 4**. The table presents the OLS (model I), first-stage

**Table 3: Fuzzy RD Results: Individual House Values**

	OLS (I)	First-Stage (II)	RD-IV (III)	Reduced-Form (IV)
Dep. Var.	Log House Value	Covenanted	Log House Value	Log House Value
Covenanted	0.009 (0.005)		0.034* (0.014)	
Dummy built 1948		0.308*** (0.082)		0.012*** (0.005)
1940 region FE	N	ED	ED	N
2010 region FE	BG	N	BG	BG
Housing Characteristics	Y	N	Y	Y
1940 Census Controls	N	Y	Y	Y
2010 Census Controls	Y	N	Y	Y
Clustered S.E.	Block	ED	Block	Block
Observations	24,182	25,389	24,182	24,182
R-sq	0.856	0.297	0.856	0.856

Note: This table presents the OLS, first-stage, IV, and reduced-form results from the fuzzy RD design with log house values (2018) as a y-variable . The main explanatory variable is a dummy for being covenanted [1945-1952]. The instrument is a dummy for a house being built before the RD cut-off point of 1948 (a dummy for being built before 1949). ED stands for enumeration district and BG stands for block group. The individual house characteristics are lot square footage, building square footage, number of bedrooms, number of bathrooms, number of stories, roof type, construction type, and exterior type. The 2010 census control variables are census block population, share of people above 18, 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 ownership rate residents (1940) at the enumeration district level. We restrict our analysis to lots that are single family residential, 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, Zillow (2021), and the Mapping Prejudice project.

Figure 4: House Value per Square-Foot over Time



Note: Plot is created by regressing a house value per square-feet on block group fixed effects and bins of distance to the 1948 boundary. Plot indicates the coefficients on the year built bins. The bin closest to the boundary on the enforceable covenants side is normalized to zero. 95% confidence intervals are shown.

(model II), fuzzy RD design (models III), and reduced form (IV) with log house valuations (2018) as a dependent variable. All models limits analysis to year of houses built 1945-1952, both years inclusive. The OLS results from model I find that a lot being covenanted increases the present-day house values by 1% controlling for home characteristics and comparing houses in similar areas (block group level). The model controls for location characteristics and standard errors are clustered 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 1% 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)). Moreover, covenants had little impact on housing characteristics themselves. **Table 4** shows the effect of covenants on various housing characteristics on two

Table 4: Balance Checks

	I	II
	1945-1952	1945-1954
Lot SF	508.5 (300.2)	-332.6 (464.2)
Built SF	105.8* (51.27)	62.72 (37.65)
Nearest Water	-15.19 (22.37)	-2.238 (22.40)
Bedrooms	-0.074 (0.066)	0.015 (0.058)
Bathrooms	0.168*** (0.045)	0.167*** (0.040)
No. of Stories	-0.045* (0.022)	-0.090*** (0.020)

Note: This table shows the balance on pre and post 1948 housing characteristics. Columns I and II report the coefficients on the covenants dummy in the RD-IV equation.

time periods 1945-1952 and 1945-1954.

Model II 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 30.8%. 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 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 III (preferred specification) presents the main results from the 2SLS IV fuzzy



RD design with location fixed-effects at block group level while Model IV presents the reduced-form model results of regressing dummy for build year  $\leq 1948$  on log house values. We find that houses prices were 1.2% higher for houses built before 1949 than after it. 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, 3.4% higher house value in 2018 in our preferred specification. 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 7**). Additionally, as can be 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.<sup>9</sup>. See Appendix **D.2** for the robustness tests.

## 4.5 Individual House Price Results over Time

To understand how house prices differed between covenanted and non-covenanted lots in the past, we take a random sample of 2,000 of the 21,654 properties built between 1945-1951 and collect historic house sale prices for them. To get historic house sale prices, we collect the mortgage documents for these houses from the Hennepin county. Of the 2,000 properties, we are able to infer the house prices for 1,704 houses. To do this, we use the mortgage terms as well as information on the type of mortgage—conventional, Veteran Affairs (G.I. Bill), or Federal Housing Authority (FHA)—we construct historic house sale prices. We estimate the the down payment based on type of mortgage: 10% for FHA and G.I. Bill loans and 20% for conventional mortgage. As can be seen from **Table A2**, the OLS model estimates that covenanted houses were 8.1% of higher value than non-covenanted houses while the RD-IV estimates a 17.7% increased value for covenanted houses. The difference between house prices between covenanted and non-covenanted houses was twice as high for 1945-1951 than in the 21st century. We also see that the OLS model underestimates the effect of racial covenants on house

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<sup>9</sup>We also explore the effect of covenants in the medium-term by examining homes sold between 1985-1990. In **Appendix ??**, 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.

prices, although to a much smaller degree in the historic house price results.

We compare our results with alternative time periods using historic sales data from Zillow (2021) and the tax assessor. An important aspect to note about sales data is the non-randomness of the houses sold in a particular year that do not represent the universe of houses. Following our previous empirical strategy we examine home sales from 2001-2005 and the tax assessor data from 2017. **Figure 5** shows that the effects of covenants were generally higher in the past and have more recently diminished. However, the period of 2001-2005 also corresponded to a general national trend of higher home sale values which may have led to an upward bias of our estimated coefficient.

#### **4.6 Mechanisms for Persistent Effects on House Prices**

Results from **Table 3** indicate that the OLS model underestimates the effect of racial covenants on house prices, indicating that unobserved location quality is negatively correlated with probability of being covenanted. Locations with higher amenities like closer proximity to lake had price and other mechanisms to keep people of color out of their neighborhoods. Covenants were added by developers in low natural amenity locations to boost prices by creating a all-white neighborhood amenity. Here we highlight two pieces of evidence supporting this fact. First, **Figure 6** plots the the marginal effects from a logit specification on probability of adding a covenant between 1945-48 where the independent variable is share of houses with house values from 1940 census between various ranges. As can be seen from the figure, the probability of adding a covenant is much higher in the lower-middle class neighborhoods where the 1940 house values were low, but not the lowest.

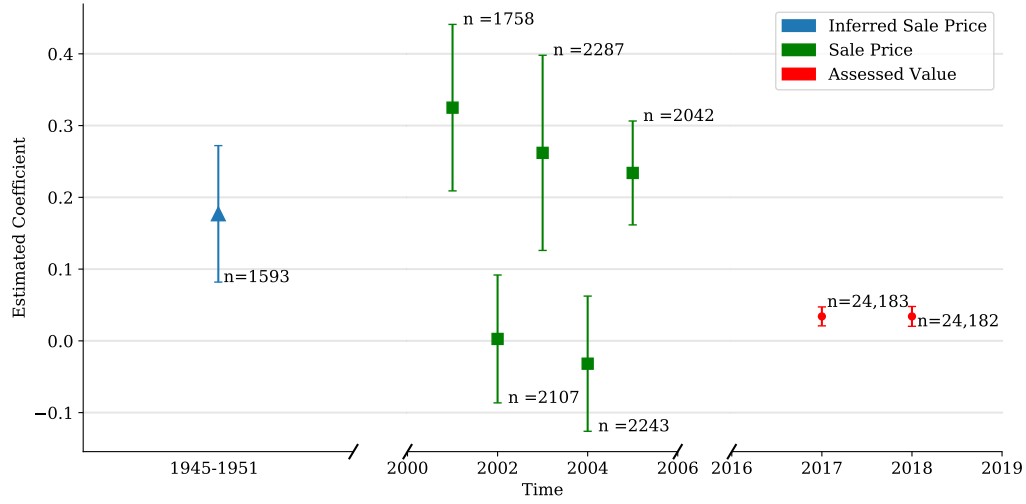
Second, Almagro et al. (2021) find that covenants were added in wetland locations as conjectured by historians. A 1% increase in hydric soils (past swamp/wetland indicator) within a lot, results in a 1.9-3.4% increase in likelihood of having a covenanted lot in 1910-1948. Thus, covenants were an instrument for developers to create a new permanent “amenity” into areas without true natural amenities (or disamenities like swamps) and charge higher prices for the lower-middle class blue-collar neighborhoods. This in turn kept African Americans out of lower-middle, middle, and working class neighborhoods.

Table 5: RD-IV for Homes Built 1945-1952

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. Var	Log House Value	Log House Value	Log House Value	Log House Value	Log House Value	Log House Value
Covenanted	-0.061* (0.024)	0.034* (0.014)	0.036* (0.015)	0.031* (0.014)	0.037** (0.014)	0.030* (0.015)
Highways			0.147*** (0.017)			0.154*** (0.017)
Highways-Sq			-.040*** (0.007)			-0.004*** (0.007)
Water				-0.068*** (0.010)		-0.081*** (0.010)
Schools	N	N	N	N	Y	Y
1940 region FE	ED	ED	ED	ED	ED	ED
2010 region FE	N	BG	BG	BG	BG	BG
Housing Characteristics	Y	Y	Y	Y	Y	Y
1940 Census Controls	Y	Y	Y	Y	Y	Y
2010 Census Controls	Y	Y	Y	Y	Y	Y
Clustered S.E.	Block	Block	Block	Block	Block	Block
Observations	24,182	24,182	23,872	24,182	24,182	23,872
R-sq	0.695	0.856	0.858	0.857	0.859	0.862

This table presents the RD-IV results from the fuzzy RD design with log house values (2018) as a y-variable with cut-offs restricted to 1945-1952. 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 (a dummy for being built before 1949). We use the linear distance in kilometers from each home to nearest highway and body of water. Houses are categorized to the set of elementary schools available. We restrict our analysis to lots that are single-family residential in nature, excluding apartment buildings. Standard errors are clustered at census block level. The additional data comes from the School Attendance Boundaries Survey (SABS), the National Highway Planning Network (NHPN) and Minnesota geospatial commons

Figure 5: Estimated Coefficient Over Time



Note: This figure shows the estimated coefficient of the effects of covenants across three time periods and data sources: 1945-1951, 2001-2005, and 2017-2018. The 1945-1951 data comes from historic mortgage archives of 2,000 properties randomly selected from our sample. The 2001-2005 sales data comes from ZTrax (Zillow (2021)). The 2017-2018 comes from the Hennepin county tax assessor.

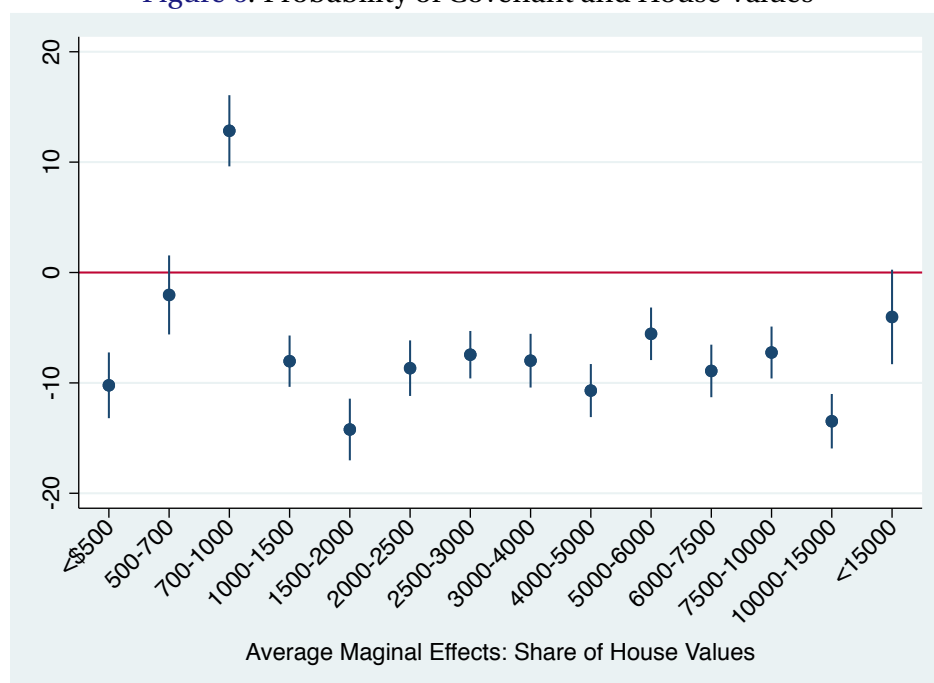
Third, as can be seen from **Table 5** model (I), not including location fixed effects results a negative coefficient on the covenants dummy. This indicates that when we compare all house across location in the Twin Cities, covenants were added in decidedly worse location amounting to 6% lower house values.

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; and 3) preference externalities or racial sorting.

#### 4.6.1 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

Figure 6: Probability of Covenant and House Values



Marginal effects from Logit specification on probability to write a covenant between 1945-48. Independent variable is share of houses with values between ranges in 1940 Census.

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.

#### 4.6.2 Preference Externality and Racial Sorting

The second 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 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.

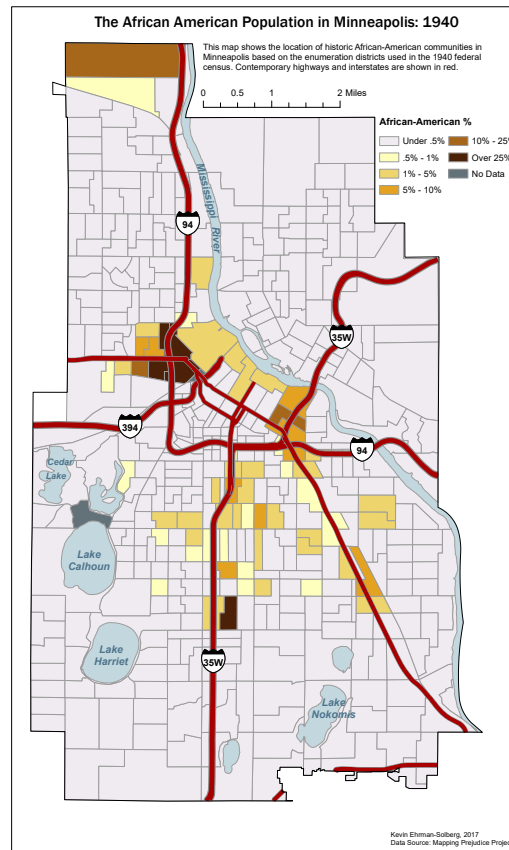
#### 4.6.3 Public Investment

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 7**, 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.

In this section, we incorporate the effect of local geographical amenities have on home prices. More specifically, we incorporate the effect of a home's proximity to highways, local bodies of water (i.e. lakes and rivers), and elementary schools attendance zones have on home values. **Table 5** shows that once our model takes into account a home's distance (in kilometers) from highways covenants still increase home values by 3.6%. For school attendance zones, we create a sets for all the unique set of elementary schools a child may attend. For example, if there are two schools A and B. Some homes reside in an area where they may attend either schools A, B, or both A and B.

Model II in **Table 5** shows the preferred specification with location fixed effects but no amenities. In model III, we add distance to highway (in meters) and distance to highway squared. In model IV we add distance to lakes and rivers (in meters), and in model V we add school attendance zone dummies. Model IV adds all three amenities. None of these public amenities, especially schools and highways reduce the value of the

Figure 7: African-American Population and Highway Location



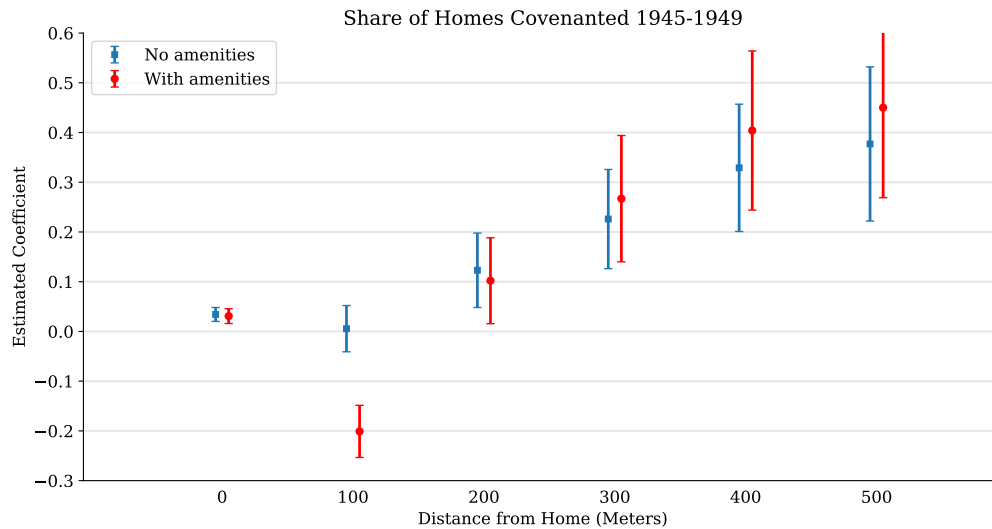
**Note:** This figure plots the African-American population in 1940 in Minneapolis and highway locations. The development of highways in the 1950s intentionally avoided areas where covenants were located. Instead, they cut through several areas where there were concentrations of African-American populations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

estimated coefficient on the covenants dummy. This may indicate that differences in public amenities might not be the reason behind the persistent effects but sorting or private investment are driving the persistence in the effects from covenants.

## 5. Externalities from Covenants

The reach of a home's covenant extends beyond the confines of a homeowner's property lines. If more houses are covenanted in an area, the perceived "benefits" from covenants might be higher. In this section, we explore the spillover effects of covenants on neighboring properties. We count the total number of single-family homes within the radius of 500 meters at 100 meter intervals. We then also count the number of

Figure 8: Externalities from Covenants Built 1945-1949



This figure shows the results from RD-IV specification that has two endogenous variables: self-covenant dummy as well as share of other houses covenanted around a 100-500 meter radius around one's house. Instruments are a dummy of house built before 1949 and the share of house built before 1949. Red indicates specification with public amenities: distance to lakes and highways and elementary school attendance zone dummies.

covenanted homes built between 1945-1948 within the same distance to calculate the share of homes covenanted. Using the Supreme Court decision as an instrument for both a covenanted single-family home and the share of homes covenanted, we determine their causal effects on home valuation. **Figure 8** shows the result of RD-IV regression on the share of homes which are covenanted within various distances from homes which were covenanted between 1945 and 1949. This figure shows the results from RD-IV specification that has two endogenous variables: self-covenant dummy as well as share of other houses covenanted around a 100-500 meter radius around one's house. Instruments are a dummy of house built before 1949 and the share of house built before 1949. Red indicates specification with public amenities: distance to lakes and highways and elementary school attendance zone dummies. Even controlling for local amenities, the greater the share of homes around a property - covenanted or not - the greater the home valuation in 2018. Results indicate that when only self-house is covenanted the house price for covenanted homes is higher by 3.4%. Increasing the share of covenanted homes by 1% in a 100m and 200m radius around the house has no effect on house value



other than the self-effect. However, increasing the share of covenanted homes by 1% in a 300m, 400m, and 500m radius around the house increases house value by 27%, 40%, and 45%, respectively. This indicates the role of covenants as a neighborhood and group instrument.

## 6. Covenants and Segregation

In this section, we investigate the effects of covenants on neighborhood characteristics.

### 6.1 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:

$$Y_{it} = \alpha_0 + \alpha_1 \%cov_{is} + \beta_1 X_{it} + \theta\eta_i + \epsilon_{it} \quad (3)$$

$$\%cov_{is} = \gamma_0 + \gamma_1 \%built_{is} + f(Date_s) + \beta_1 X_{es} + \eta_e \epsilon_{es} \quad (4)$$

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  $t = 2010$ .  $\%cov_i$  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).  $\%built_{is}$  is the share of houses within block  $i$  that were built right before the 1948 cutoff point. **Figure 9** shows the relationship between the our main variable of interest ( $\%cov_i$ ) and the instrument ( $\%built_{is}$ ).  $e$  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 approximate a normal 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.

## 6.2 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 9** 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 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 A5** 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 A5** 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

Table 6: 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 covenanted		-0.025 (0.018)	-0.189*** (0.058)	0.086 (0.069)
Percent of homes built <= 1948	0.006*** (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 7: 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 covenanted	-0.140* (0.077)	-0.055 (0.060)	0.035 (0.133)	-0.096 (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.

Figure 9: 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*

rates by 19%.

Additionally, as can be seen in Model I in **Table 6** 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 14%. 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 6 and 7** are with transformed arcsinh dependent variable, see **Tables A5 and A6** in **Appendix D.5** 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.

## **7. 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 3.4% 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 covenants were effective in keeping middle-class African Americans 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. 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. Another approach could help us understand the effects of covenants for the time-period they were active.

## References

- Aaronson, Daniel, Daniel Hartley, and Bhashkar Mazumder, “The Short-and Long-Run Effects of the 1930s HOLC” Redlining” Maps,” in “Journal of Economic History,” Vol. 78 Cambridge University Press 32 Avenue of the Americas, New York, NY 10013-2473 USA 2018, pp. 620–620.
- Acemoglu, Daron, Simon Johnson, and James A. Robinson, “The Colonial Origins of Comparative Development: An Empirical Investigation,” *American Economic Review*, December 2001, 91 (5), 1369–1401.
- Ahlfeldt, Gabriel M., Stephen J. Redding, Daniel M. Sturm, and Nikolaus Wolf, “The Economics of Density: Evidence From the Berlin Wall,” in “,” Vol. 83 2015, pp. 2127–2189.
- Allen, Marcus T, Grant W Austin, and Mushfiq Swaleheen, “Measuring highway impacts on house prices using spatial regression,” in “Journal of Sustainable Real Estate,” Vol. 7 American Real Estate Society 2015, pp. 83–98.
- Almagro, Milena, Aradhya Sood, and Kevin Ehrman-Solberg, “The Effects Of Discrimination In Housing Markets: Evidence From Historical Racial Covenants In Minneapolis,” Technical Report, Working Paper 2021.
- Ancestry, “1940 United States Federal Census,” 2021.
- Angrist, Joshua D and Jörn-Steffen Pischke, *Mostly harmless econometrics: An empiricist's companion*, Princeton university press, 2008.
- Appel, Ian and Jordan Nickerson, “Pockets of Poverty: The Long-Term Effects of Redlining,” in “SSRN” 2016.
- Baum-Snow, Nathaniel, “Did highways cause suburbanization?,” *The quarterly journal of economics*, 2007, 122 (2), 775–805.
- Black, Sandra E. and Philip E. Strahan, “Entrepreneurship and Bank Credit Availability,” *The Journal of Finance*, 2002, 57 (6), 2807–2833.
- Bleakley, Hoyt and Jeffrey Lin, “Portage and path dependence,” *The quarterly journal of economics*, 2012, 127 (2), 587–644.

- Brinkman, Jeffrey and Jeffrey Lin, “Freeways Revolt!,” in “Working Paper” 2019.
- Brown, Adrienne R and Valerie Smith, *Race and real estate*, Oxford University Press, USA, 2016.
- Cameron, Stephen V. and Christopher Taber, “Estimation of Educational Borrowing Constraints Using Returns to Schooling,” *Journal of Political Economy*, 2004, 112 (1), 132–182.
- Carroll, C.D., “A Theory of the Consumption Function, with and without Liquidity Constraints,” *Journal of Economic Perspectives*, 06 2001, 15, 23–45.
- Chetty, Raj and Nathaniel Hendren, “The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects\*,” in “in,” Vol. 133 02 2018, pp. 1107–1162.
- and — , “The Impacts of Neighborhoods on Intergenerational Mobility II: County-Level Estimates\*,” *The Quarterly Journal of Economics*, 02 2018, 133 (3), 1163–1228.
- , John N Friedman, Nathaniel Hendren, Maggie R Jones, and Sonya R Porter, “The opportunity atlas: Mapping the childhood roots of social mobility,” Technical Report, National Bureau of Economic Research 2018.
- Connerly, Charles E., “From Racial Zoning to Community Empowerment: The Interstate Highway System and the African American Community in Birmingham, Alabama,” *Journal of Planning Education and Research*, 2002, 22 (2), 99–114.
- David, Paul A., “Clio and the Economics of QWERTY,” in “in,” Vol. 75 American Economic Association 1985, pp. 332–337.
- Duranton, Gilles and Diego Puga, *Micro-Foundations of Urban Agglomeration Economies*, Vol. 4, 09 2003.
- Fishback, Price V, Jessica LaVoice, Allison Shertzer, and Randall Walsh, “Race, Risk, and the Emergence of Federal Redlining,” Technical Report, National Bureau of Economic Research 2020.
- Heblich, Stephan, Stephen Redding, and Daniel Sturm, “The Making of the Modern Metropolis: Evidence from London,” in “,” Vol. 83 2015, pp. 2127–2189.
- Henderson, J Vernon, Tim Squires, Adam Storeygard, and David Weil, “The global distribution of economic activity: nature, history, and the role of trade,” *The Quarterly Journal of Economics*, 2018, 133 (1), 357–406.



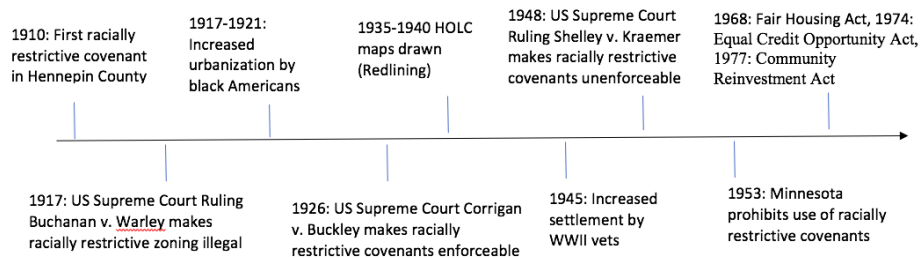
- Jones-Correa, Michael, "The origins and diffusion of racial restrictive covenants," *Political Science Quarterly*, 2000, 115 (4), 541–568.
- Kaul, Greta, "With covenants, racism was written into Minneapolis housing. The scars are still visible.," Feb 2019.
- Krimmel, Jacob, "Persistence of Prejudice: Estimating the Long Term Effects of Redlining," in " " 2017.
- Lee, Sanghoon and Jeffrey Lin, "Natural amenities, neighbourhood dynamics, and persistence in the spatial distribution of income," *The Review of Economic Studies*, 2018, 85 (1), 663–694.
- Redding, Stephen J. and Daniel M. Sturm, "The Costs of Remoteness: Evidence from German Division and Reunification," in " ," Vol. 98 December 2008, pp. 1766–97.
- Rosenthal, Stuart and William Strange, "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., Vol. 4, Elsevier, 2004, chapter 49, pp. 2119–2171.
- Rothstein, Richard, *The color of law: A forgotten history of how our government segregated America*, Liveright Publishing, 2017.
- Shertzer, Allison, Tate Twinam, and Randall P. Walsh, "Race, Ethnicity, and Discriminatory Zoning," in " ," Vol. 8 July 2016, pp. 217–46.
- Waldfoegel, Joel, "Preference externalities: An empirical study of who benefits whom in differentiated product markets," Technical Report, National Bureau of Economic Research 1999.
- , "The median voter and the median consumer: Local private goods and population composition," *Journal of Urban Economics*, 2008, 63 (2), 567–582.
- Zenou, Yves and Nicolas Boccoard, "Racial Discrimination and Redlining in Cities," in " ," Vol. 48 2000, pp. 260 – 285.
- Zillow, "Zillow's Assessor and Real Estate Database," *Zillow Research*, 2021.

# Long Shadow of Racial Discrimination: Evidence from Housing Racial Covenants

by Aradhya Sood and Kevin Ehrman-Solberg

## ONLINE APPENDIX

### 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

556

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

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

**This Indenture**, Made this 18th day of November, 1939  
between Sheldon Blair and Gladys R. Blair, his wife

of the County of Hennepin and State of Minnesota, Parties  
of the first part, and Claude Bartlett & Catherine Ruth Bartlett  
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 consisting 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 R. 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 seised 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. Rutze } Sheldon Blair  
Vernice T. Walker } Gladys R. Blair  
State of Minnesota, }  
County of Hennepin } ss. (Fifty Cent in  
(Stamp Cancelled)

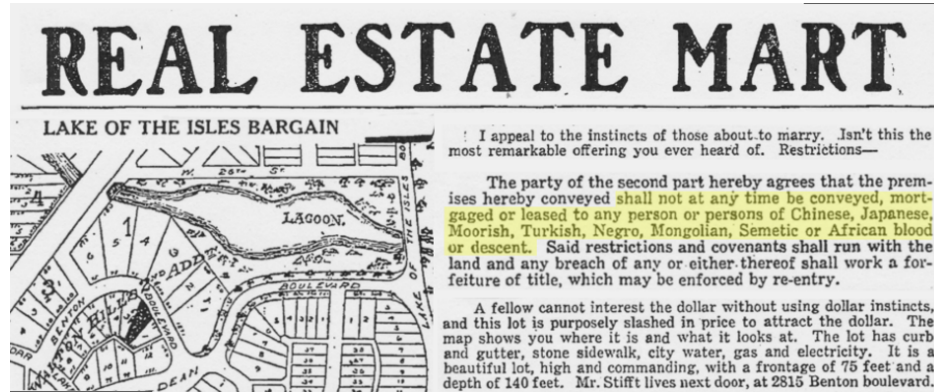
On this 24 day of November, 1939, before me, a  
Notary Public Sheldon Blair and Gladys R. Blair, his wife  
within and for said County, personally appeared  
to me known to be the persons described in, and who executed the foregoing instrument, (See Note)  
and acknowledged that they executed the same as their free act and deed. (See Note)

(Notarial Seal) Vernice T. Walker Vernice T. Walker  
Notary Public Hennepin County, Minn.  
My Commission expires August 5, 1948

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

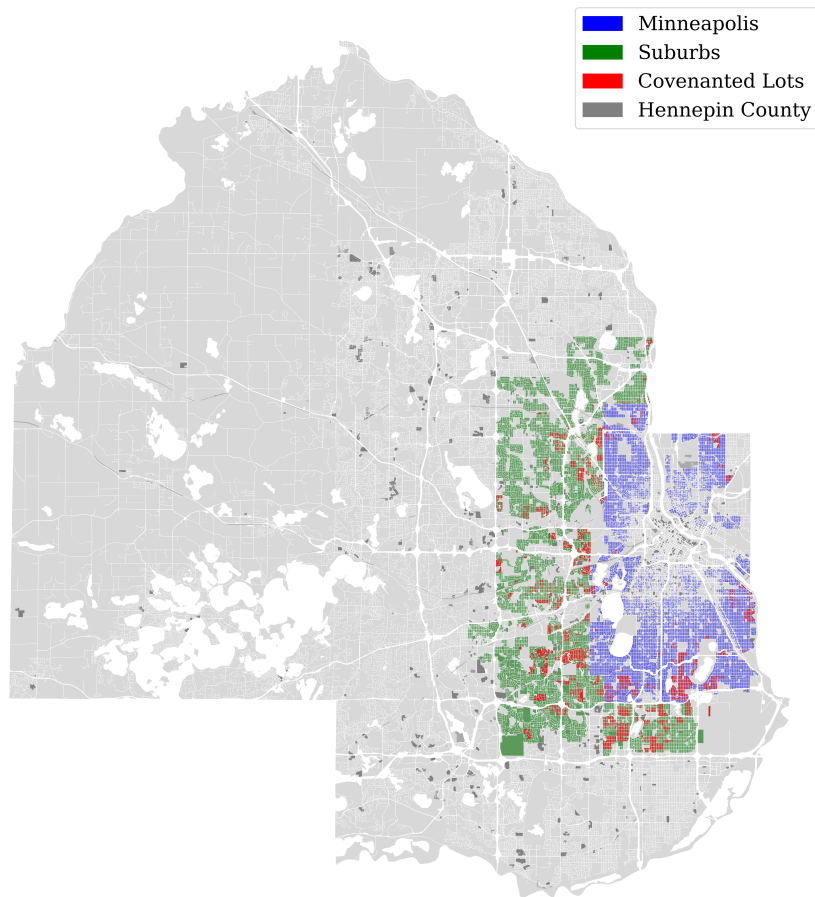


## C. Mapping Prejudice Data and Our Sample

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.

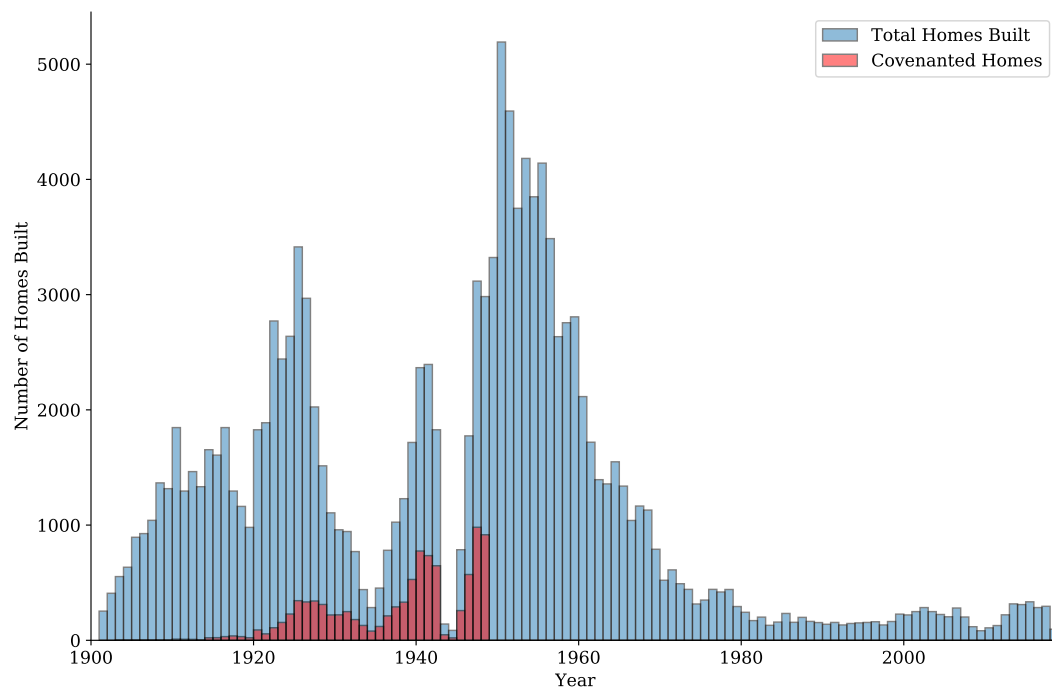
We then combine the MP data with with 2018 tax assessor data from Hennepin County containing not only values of the homes and land, but also housing characteristics such as the number of stories, home square footage, lot size, and so forth. We then limit our analysis to homes which are categorized as 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

Figure C.1: Our Sample



**Note:** This figure shows our sample. Blue indicated houses built in Minneapolis, green indicates houses in the suburbs, and red indicated houses that are covenanted.

Figure C.2: Housing Construction and Covenants over Time



**Note:** This figure shows the housing construction and covenants over time.

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 3**. 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 Regression Robustness Tests

**Table A1** presents some robustness results for our sample results with block group level fixed effects 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 1945-1954 where the 2018 house values are 3.7% higher. We do not go further out of the bandwidth 1945-1954 to not only stay closer to the boundary but also to not confound our results with effects of the Second World War. Model IV, 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 3.0% higher if they had racially-restrictive covenants.

We consider alternative cutoffs for our analysis. First, we consider the possibility whether

## D.3 Assessor vs Sale Data

Our primary variable of interest in our house-level results is the 2018 house valuation from the Hennepin county tax assessor’s office. To alleviate concerns that the tax assessor data is a poor approximation for the market value of homes, we regress the assessed value on homes sold in 2018 recorded in Zillow (2021). As shown in **Figure D.1**, the assessor data tracks very closely with the sale data. Due to gifts to friends and family members to one another in the sales data, the assessor data may more closely align to the true valuation of a home than the sales data.

## D.4 Alternative Cut-Offs

We also consider alternative cut-off dates for our RD-IV. Our endogenous variable is a fuzzy regression discontinuity around the 1948 Supreme Court decision. We in **Table A4** that there were no anticipatory effects of such a decision by following our same empirical strategy but assuming a 1947 Supreme Court ruling. At the same time, we also consider if the decision occurred in 1949 and show that homes which would have been covenanted have a 3.7% higher home valuation.

## D.5 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 rates across different races and percentage of minority residents as a dependent variable. While results in **Tables A5 and A6** are with transformed untransformed dependent variable in percentages, see Section 6.2 with transformed arcsinh dependent variable. Models II, III, and IV in **Table A5** 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 pop-

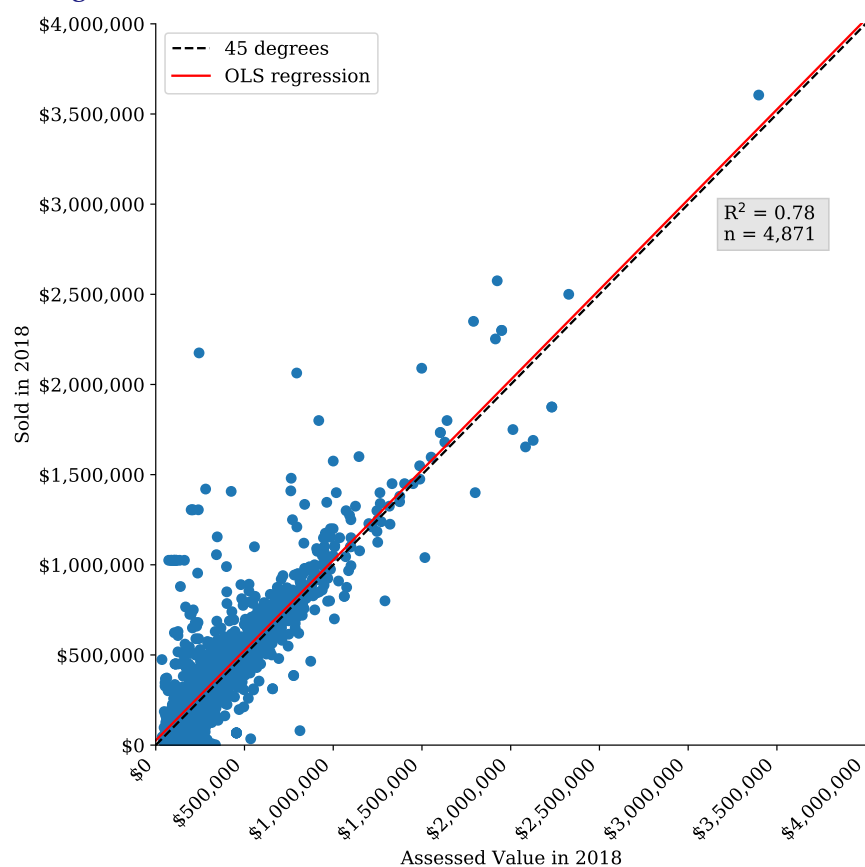


Table A1: Robustness Tests for Fuzzy RD Results at House-Level Analysis

	1945-1954	1946-1951	1947-1950	Donut
	(I)	(II)	(III)	(IV)
Dep. Var	Log House Value	Log House Value	Log House Value	Log House Value
Covenanted	0.037** (0.012)	0.023 (0.016)	-0.003 (0.018)	0.030*** (0.008)
1940 region FE	ED	ED	ED	ED
2010 region FE	BG	BG	BG	BG
Housing Characteristics	Y	Y	Y	Y
1940 Census Controls	Y	Y	Y	Y
2010 Census Controls	Y	Y	Y	Y
Clustered S.E.	Block	Block	Block	Block
Observations	31,682	19,926	13,897	18,167
R-sq	0.858	0.858	0.885	0.855

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 1945-1954 (model I), 1946-1951 (model II), and 1947-1950 (Model III). Model IV is a “Donut” RD with years 1945-1947 and 1950-1952. 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 (a dummy for being built before 1949). The individual house characteristics are lot square footage, building square footage, number of bedrooms, number of bathrooms, number of stories, roof type, construction type, and exterior type. 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 single-family 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, Zillow (2021), and the Mapping Prejudice project.

Figure D.1: Assessed Value of Homes vs Sale Amount in 2018



**Note:** This compares the Hennepin county tax assessor data in 2018 with Zillow sales data for the same year. Homes sold over \$4,000,000 and under \$1,000 are excluded from our sample to avoid outliers and gifts to family members. Source: Zillow (2021) and Hennepin County Tax Assessor's Office

**Table A2:** Fuzzy RD Results: Individual House Values (1945-51)

	OLS	RD-IV
Dep. Var.	Log House Price	Log House Price
Covenanted	0.0813*** (0.0159)	0.177 (0.110)
1940 region FE	E.D	E.D
Housing Characteristics	Y	Y
1940 Census Controls	N	Y
Type of Mortgage	Y	Y
Clustered S.E.	E.D	E.D
Observations	1,584	1,593
R-sq	0.195	0.179

Note: This table presents the OLS and IV results from the fuzzy RD design with log house values (1945-51) as a y-variable. 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).

ulation (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 A6** 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-

**Table A4:** Alternative Cutoffs for 2018 House Values (1945-54)

	RD-IV 1947 Cutoff (I)	RD-IV 1949 Cutoff (II)
Dep. Var.	Log House Price	Log House Price
Covenanted	0.005 (0.012)	0.037*** (0.011)
1940 region FE	ED	ED
2010 region FE	Block	Block
Housing Characteristics	Y	Y
1940 Census Controls	Y	Y
2010 Census Controls	Y	Y
Clustered S.E.	Block	Block
Observations	31,897	31,682
R-sq	0.857	0.858

The above considers alternative cutoffs from our 1948 Supreme Court decision for our fuzzy RD-IV. The first column assumes a 1947 decision while the second column assumes a 1948.

Table A5: 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 (0.027)	-0.045 <sup>**</sup> (0.022)	0.034 (0.027)
Percent of homes built $\leq 1948$	0.104 <sup>***</sup> (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

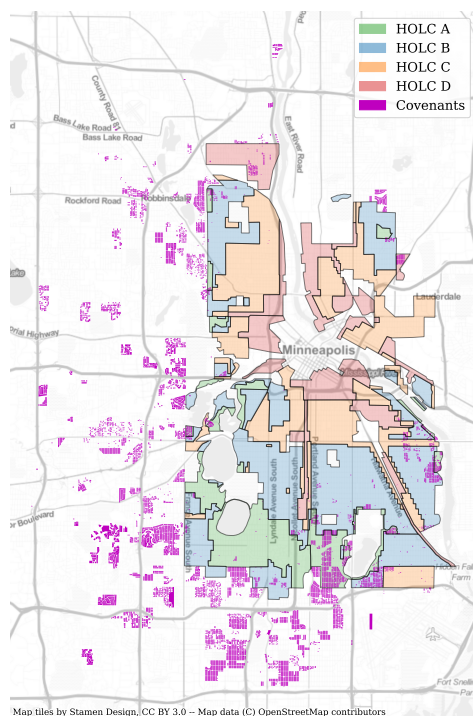
This table presents the first-stage and IV results from the fuzzy RD design with percentage of home ownership across races as dependent variables. The analysis is restricted to homes built 1945-1951. The main explanatory variable is the percentage of census block built 1945-1948 and covenanted. The instrument 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 A6:** 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 <sup>^*</sup> (0.028)	0.059 (0.042)	0.063 (0.064)	0.004 (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

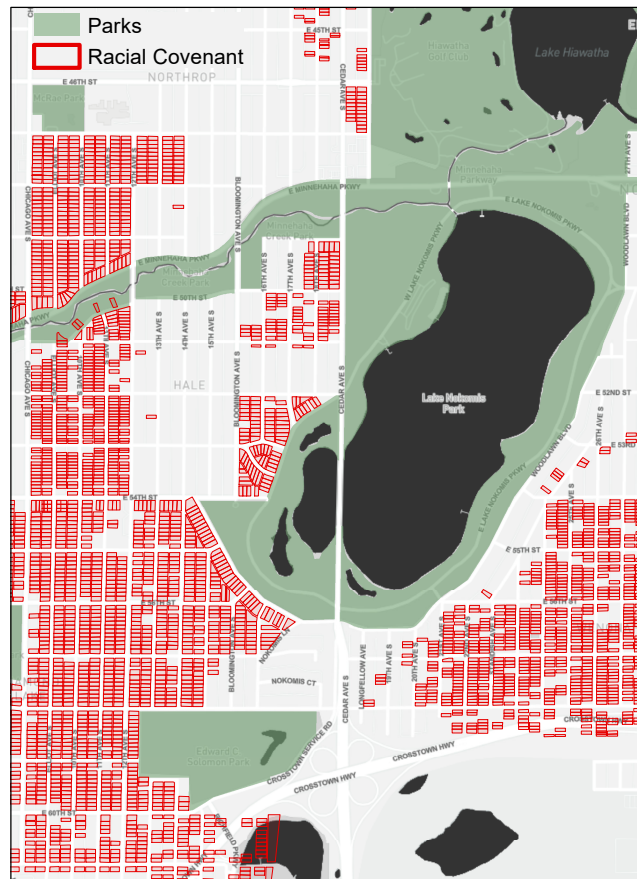
This table presents the IV results from the fuzzy RD design with percentage of renting across races and percentage of minority population as dependent variables. The analysis is restricted to homes built between 1945-1951. The main explanatory variable is the percentage of census block built between 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.

Figure E.1: 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*

Figure E.2: Racial Covenants and Amenities–Lake Nokomis



**Note:** This figure plots racial covenants around Lake Nokomis. Data from Mapping Prejudice project.

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 E.1**, 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 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)).