Did Decreasing Residential Segregation Reduce Racial Wealth Inequality?*

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Abstract

Following the Fair Housing Act (FHA), which ended lawful housing discrimination in the US in 1968, racial residential segregation decreased rapidly, and Black families started to accumulate housing wealth at a faster pace than Whites. In this paper, I examine whether the FHA could jointly explain these two phenomena, and I simulate how the FHA affected racial wealth inequality. I first present three stylized facts, which show that during the 1970s, racial residential segregation started to decline, the relocation of Black families from Black neighborhoods intensified, and average housing wealth increased rapidly among Black families. To investigate whether the FHA supported these changes, I estimate a heterogeneous agent life-cycle OLG model with spatial equilibrium and endogenous house prices. With this model, I simulate how the FHA affected families' relocation across neighborhoods, neighborhood-level house prices, and the Black and White wealth distribution. Based on my simulation results, the FHA could explain the observed relocation patterns, the decreasing residential segregation, and partly the increasing housing wealth of Black families. My results suggest that the FHA substantially decreased racial wealth inequality at the top while, somewhat unexpectedly, it increased racial wealth inequality between the 2nd and 7th deciles of the wealth distribution.

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1 Introduction

Despite numerous ongoing federal programs aiming to decrease racial wealth inequality, today the Black-White wealth gap is nearly as large as it was during the second half of the 1970s. Based on the 2022 wave of the Survey of Consumer Finances, the median non-Hispanic White household has more than six times as much net wealth as the median Black, a ratio that has not decreased since the middle of the 1980s. Racial wealth differences decreased rapidly during the Civil Rights Movement and the passage of the Fair Housing Act (FHA) in 1968 was expected to aid this process by shrinking racial differences in wealth accumulation. The Fair Housing Act promoted racial equity in access to housing wealth by banning racial discrimination in housing sales, rental, or financing, and, through them, ended lawful housing segregation in the United States. The halt of the racial wealth convergence during the 1980s is puzzling, as many scholars, such as Shapiro (2017) and Rothstein (2018), argue that racial segregation was a key element of the build-up of racial wealth differences.

In this research, I quantify whether terminating housing discrimination decreased residential segregation and reduced racial wealth inequality following the Fair Housing Act. I first present three stylized facts, which show sizable changes in neighborhood sorting and housing wealth accumulation right after the passage of the Fair Housing Act in 1968. First, the long-run increase of residential segregation between Black and non-Black families stopped during the 1970s, and until 2000 racial segregation declined as much as it increased during the Great Migration between 1910-1970 (Cutler et al., 1999; Boustan, 2011). Second, Black neighborhoods experienced a significant and unprecedented outflow of Black families during the 1970s, which continued in later decades at a slower pace as well (Ellen, 2000). Finally, I show that following the FHA, the homeownership rate and the average net housing wealth increased at a faster pace among Black than White families.

I am interested in whether these three stylized facts are interrelated: the relocation of Black families following the FHA may have led to the outflow of Black families from Black neighborhoods and decreased segregation. The possibility of buying a home in more integrated neighborhoods could have motivated more Black families to become homeowners and accumulate housing wealth. In this way, the Fair Housing Act could have led to decreasing racial segregation and declining racial differences in housing and total wealth in the long run. However, as the slowdown of convergence in racial wealth inequality during the 1980s illustrates (Derenoncourt et al., 2024), drawing such a causal line is challenging because of the ever-changing economic environment. Without further assumptions, it is infeasible to distinguish the effect of the FHA from other economic developments during the 1970s, like the quickly growing real incomes of Black families.

This research examines the possible causal link between the FHA and these stylized facts and quantifies how the FHA affected racial wealth inequality. I quantify the effect of FHA on residential segregation and racial wealth inequality within a quantitative model, which allows me to rule out all economic changes of the 1970s other than the FHA. I estimate a heterogeneous agent life-cycle overlapping-generation model with spatial equilibrium and endogenous house prices, which allows me to jointly model the homeownership decision and location choices. In the model, neighborhood-level house prices are set in spatial equilibrium, and agents' relocation among neighborhoods creates changes in house prices and, through these, in housing wealth and wealth distribution. I estimate this model using the simulated method of moments to match the spatial and wealth distributions observed in the 1970 decennial census and the Survey of Consumer Finances Plus, assuming that some Black households were not allowed to move into White neighborhoods before the FHA.

I simulate the effect of the FHA by lifting relocation barriers that prevented Black households from residing in White neighborhoods. As Black families relocate among neighborhoods in the model, house prices increase in neighborhoods that gain new residents and decline in those with declining populations, which could motivate White families to move as well. After the relocation of households, a new steady state spatial equilibrium emerges with new house prices, with new spatial distribution, and with new Black and White wealth distribution. I quantify the effect of the FHA by comparing how the steady state spatial distribution and wealth holding of agents changed due to the relocation of Black families.

My simulation results suggest that the FHA decreased the most common measure of segregation, the dissimilarity index between Blacks and non-Blacks, by 6.8 percentage points, which is slightly higher than the observed decline in segregation during the 1970s, which was 6.1 percentage points. I find that the FHA decreased racial differences in average housing wealth, but it has a heterogeneous effect on racial wealth inequality by initial wealth level. In the model, the end of lawful segregation moderately increased wealth inequality among Black families. The wealth holding of the top 25% of the Black wealth distribution increased by 1.5-4%, while the wealth in the 6th Black wealth decile decreased by 1%. As the policy's effect on the White wealth distribution was slightly positive between the 2nd and 8th deciles, racial wealth inequality decreased between the 8th and 10th and increased between the 2nd and 7th deciles of the wealth distribution. My results suggest that the Fair Housing Act did not decrease racial wealth inequality in all parts of the wealth distribution; moreover, I find that racial wealth inequality increased in the majority of the wealth distribution because of the Fair Housing Act.

Amongst first in the literature, I model agents' homeownership and location choices jointly within a dynamic model, which yields new insights into how homeownership decision affects neighborhood choices over the life-cycle. In this way, my study contributes to the growing literature that studies how homeownership or spatial sorting affects wealth inequality. To the best of my knowledge, besides this paper, only Richard (2024) studies how joint homeownership and location choice affect wealth inequality within a structural model. In the literature on spatial sorting, both static (Almagro and Domínguez-Iino, 2024; Weivu, 2024; Davis et al., 2023) and dynamic (Fogli and Guerrieri, 2019; Aliprantis and Carroll, 2018; Chyn and Daruich, 2021) models abstract from modeling homeownership. Because of this modeling simplification, these models cannot capture how families move between neighborhoods to accumulate housing wealth. My paper contributes to this literature by modeling homeownership decisions, race-dependent mortgage markets, and house market frictions directly, quantifying how ownership motivation affects Black and White families' location choices differently over their life-cycle. My paper also quantifies how spatial relocation of agents affects racial wealth inequality through housing wealth, which so far has not been modeled directly in this literature. My paper also contributes to the literature in macroeconomics that studies the determinants of homeownership decisions over the life cycle (Yang, 2009; Brandsaas, 2021; Khorunzhina and Miller, 2022). By adding neighborhood choice into the usual dynamic framework in this literature, I quantify how the possibility of spatial relocation and changing neighborhood-level house prices affect the optimal time of becoming a homeowner over the life-cycle.

My work also contributes to the growing literature studying the determinants of Black–White wealth differences. Studies so far have investigated how racial differences in parental transfers (Charles and Hurst, 2002; Aliprantis et al., 2022), housing and total wealth accumulation (Boehm and Schlottmann, 2004; Derenoncourt et al., 2024), or family composition (Ashman and Neumuller, 2020) affect racial wealth inequality. However, the literature still lacks quantitative evidence on how the spatial sorting of families, and especially desegregation, affects wealth differences between Black and White families through the housing market. My paper contributes to this literature by showing that decreasing racial residential segregation has a sizable and heterogeneous effect on racial wealth inequality. My results suggest that desegregation could lead to increasing racial wealth inequality in the middle of the wealth distribution.

The paper proceeds as follows. In Section 2, I present three stylized facts about neighborhood sorting and changing Black housing wealth accumulation trends during the 1970s. In Sections 3 and 4, I present and estimate a quantitative model that could endogenously create neighborhood sorting, changes in neighborhood-level house prices, and changes in the Black and White wealth distribution. In Section 5, I use this model to test whether the Fair Housing Act could explain all of the three stylized facts jointly and how the FHA affected racial wealth inequality through the Black and White wealth distribution. Finally, I conclude my results in Section 6.

2 Stylized facts on segregation and racial wealth inequality during the 1970s

Data

In this research, I work with two main datasets: (1) I use census tract-level aggregates from decennial censuses to track neighborhood-level changes over time, and (2) I use the Survey of Consumer Finances Plus (SCF+) to measure changes in household asset composition and wealth inequality. My spatial analysis is based on the Longitudinal Tract Data Base (LTDB) developed by Logan et al. (2014). The unit of observations in LTDB is census tracts, and the dataset contains census tract-level aggregates of population and various socioeconomic variables, starting with with 1970 decennial census. I used the 1970-2000 waves of the study, and I interpolated each census tract in different waves into 2010 census tract boundaries using LTDB's interpolation files. This interpolation allows me to track changes in time-invariant spatial units over time. I extended LTDB with aggregated census tract information from the 1960 census using the National Historical Geographic Information System (NHGIS); I interpolated the 1960 census tract boundaries into the 2010 tract definition with a crosswalk file I created using QGIS.

Until 1990, census tract-level maps and tabulations were only created in core-based statistical areas (CBSA); thus, my sample only contains census tracts from metropolitan areas between 1960 and 2000. To focus on urban areas where Black/non-Black residential segregation was more prevalent, I follow Reardon and Bischoff (2011) by narrowing down the sample for census tracts in the 100 largest cities in 1970 with at least 10,000 Black individuals. The sample contains more than 36,000 census tracts from 87 metropolitan areas. Based on Baum-Snow (2007)'s neighborhood categorization, 23.4% of these tracts resided within the central city of the metropolitan area. As I am interested in how the share of the Black population changed in these neighborhoods, following Ellen (2000), I categorized these census tracts into three categories based on their share of the Black population at a given census year. I define a census tract as "White" if its Black share was less than 10%, as "Mixed" if its Black share was between 10-50%, and as "Black" if it was a majority Black neighborhood at a given census.[1]

I use SCF+ to measure changes in homeownership, housing wealth, and racial wealth inequality. The SCF+ was developed first by Kuhn et al. (2020), and it is the most commonly used dataset to analyze racial wealth inequality in the second part of the 20th century (Kuhn et al., 2020, Derenoncourt et al., 2023; Derenoncourt et al., 2024). The SCF+ combines early waves of the Survey of Consumer Finances run by the Survey Research Center at the University of Michigan with the post-1983 waves of the study, which were run by the Federal Reserve System. The study was run each year between 1949-71, then every three years from 1989, while between 1971-89, it was run in 1977 and 1983. The study was redesigned in 1983, but Kuhn et al. (2020) harmonized variables and reweighed earlier waves to reflect the 1983 study design. SCF+ is the only dataset that contains both total family wealth and housing asset information starting with the early 1960s. However, as SCF+ lacks panel dimension and detailed location information, I cannot analyze how potential relocation affected Black families' wealth accumulation.

To control for the different survey sizes and irregularities in the frequency of SCF survey collection, for this analysis I combine survey waves into 5-year bins. I follow Derenoncourt et al. (2024) by smoothing the time series of wealth components. While they take the unweighted moving average (MA3) of the time series, I smooth by bootstrapping the sample of a wealth component for a given bin from a pool that contains the sample of neighboring bins as well; this smoothing method also allows me to calculate the confidence interval of wealth measures. Every wealth component is measured in 1970 prices, which I deflated using the Census Bureau's C-CPI-U index.

[1] Note that, based on this categorization, majority Asian or Hispanic neighborhoods are also categorized as "White". The 1960 and 1970 censuses did not collect information on Hispanic origin, and the published white population of census tracts contains non-Hispanic and Hispanic whites as well. In these two censuses, the share of "White" neighborhoods with less than 50% of white population is just 0.1%. However, in line with the rising Hispanic population and the distinction between Hispanic and non-Hispanic whites in the 1980-2000 censuses, the share of "White" neighborhoods with less than 50% of the non-Hispanic white population in the 1980-2000 censuses was 5.2%, 9.4%, and 16.2%, respectively.

Stylized facts

Stylized fact I: The 1970s was a turning point in the history of segregation in the US

The Fair Housing Act in 1968 and the Equal Credit Opportunity Act in 1974 eased the legal barriers Black families faced moving into majority White neighborhoods, which dramatically changed the landscape of segregation in the United States (Boustan, 2011). Table 1 shows that the most often used measure of segregation, the dissimilarity index between Black and non-Black individuals, peaked at the 1970 decennial census and then declined rapidly in the following decades.[2] In just three decades, the average of the CBSA-level dissimilarity indexes dropped by 18.6 percentage points. Based on Cutler et al. (1999)'s calculation, the magnitude of this decline is larger than the dissimilarity index's increase during the Great Migration (17.7 percentage points increase between 1910-70) when nearly six million Black people moved from rural areas of Southern states to Northern urban areas. As a result, by 2000, the dissimilarity index dropped just under the threshold of 0.6, above which cities are considered very segregated (Boustan, 2011).

The extensive literature on racial segregation suggests that the decline of racial segregation was the result of the widespread relocation of Black families from majority Black neighborhoods into more integrated ones (Ellen, 2000; Fischer et al., 2004). As the spatial distribution of Black agents in Table 1 illustrates, the fraction of Black individuals living in Black neighborhoods increased between 1960-70, but then it started to decline continuously. Within 30 years, the fraction of Black individuals living in White neighborhoods almost doubled, as it increased from 7.2% to 13.4%. Meanwhile, another measure of Black presence in White neighborhoods, the average share of Black individuals in White neighborhoods nearly tripled, from 1.16% to 3.03%. By 2000, 30 years after the Fair Housing Act, almost as many Blacks lived in White and Mixed neighborhoods as in the majority Black ones. Meanwhile, the fraction of non-Black individuals living in White neighborhoods started to decline during the 1970s, primarily because many White tracts became Mixed due to the inflow of Black families.

In line with the decreasing racial residential segregation, the income residential segregation started to increase during the 1970s. As Table 1 shows, income segregation increased

[2] The dissimilarity index measures how segregated a minority group's spatial distribution is from a majority population within a larger spatial unit (like a metropolitan area). Its value can vary between 0 and 1, and larger values imply a higher level of segregation. Intuitively, the dissimilarity index shows what fraction of the minority group should be relocated to other neighborhoods to reach a random distribution of the minority group. See Massey and Denton (1988) or Reardon and Bischoff (2011) for more details.

Table 1: Segregation measures and distribution of families by Black share of neighborhoods

	1960	**1970**	**1980**	**1990**	**2000**
Residential segregation (Dissimilarity index)					
Black vs. Non-Black	0.780%	0.785%	0.724%	0.657%	0.599%
Share of Black population in White neighborhoods					
Blacks / All population	1.07%	1.16%	1.89%	2.46%	3.03%
Spatial distribution of Black population					
White neigh.	7.5%	7.2%	10.2%	12.6%	13.4%
Mixed neigh.	25.7%	22.1%	23.3%	28.1%	33.3%
Black neigh.	66.8%	70.7%	66.6%	59.3%	53.3%
Spatial distribution of Non-Black population					
White neigh.	87.1%	87.7%	85.3%	81.6%	76.9%
Mixed neigh.	10.7%	10.1%	12.3%	16.0%	20.6%
Black neigh.	2.2%	2.2%	2.4%	2.4%	2.5%
Income segregation (Rank order H), from Reardon et al. (2011)					
Among Black families		0.099	0.133	0.173	0.170
Among White families		0.110	0.117	0.132	0.139
All families		0.124	0.134	0.152	0.157

Sources and notes: 1. Dissimilarity index: own calculation based on LTDB and NHGIS data. The overall dissimilarity index is calculated as the population-weighted mean of the dissimilarity index of the 87 CBSAs in the sample. 2. Spatial distribution of Black population: own calculation based on LTDB and NHGIS data. Averages are weighted with tract population. Neighborhoods are defined based on Black share at each census year. 3. Income segregation information is taken from Reardon and Bischoff (2011).

within both Black and White families, but the rise of income segregation was much faster among Blacks (Reardon and Bischoff, 2011). The rapidly increasing income segregation among Black families suggests that most of the relocating families were from the middle and top of the Black income distribution, many of whom were potentially not allowed to move into majority White neighborhoods before the Fair Housing Act (Hirsch, 1983).

Stylized fact II: Black families started to leave Black neighborhoods during the 1970s

The relocation of Black families from majority Black neighborhoods had a sizable effect on these neighborhoods' population, and it likely sped up the population decline of Black neighborhoods. Table 2 summarizes how the average number of Black and non-Black residents changed over time in Black neighborhoods.[3] In Table 2, I use three different neighborhood categorizations: I categorized neighborhoods by their Black share in 1970 in Panel A, based on their Black share in 1960 in Panel B, and I defined neighborhoods based on

[3] In Table 2, I present the number of non-Blacks rather than non-Hispanic Whites, as computing the latter is not possible for the 1960 and 1970 censuses because of the lack of information on Hispanic origin.

Table 2: Change of average Black and non-Black population in Black neighborhoods

	1960	1970	1980	1990	2000
Panel A: Based on 1970 neighborhood categorization					
# of Black	2,870	3,774	3,180	2,731	2,429
# of non-Black	1,992	795	550	658	808
Total	4,862	4,568	3,730	3,389	3,237
Change of Black population		31.5%	-15.7%	-14.1%	-11.1%
Panel B: Based on 1960 neighborhood categorization					
# of Black	4,039	3,868	3,013	2,553	2,274
# of non-Black	1,038	579	547	696	870
Total	5,077	4,446	3,560	3,248	3,145
Change of Black population		-4.2%	-22.1%	-15.3%	-10.9%
Panel C: Based on changing neighborhood categorization					
# of Black	4,039	3,774	3,185	2,859	2,749
# of non-Black	1,038	795	680	674	706
Total	5,077	4,568	3,865	3,533	3,455
Change of Black population		-6.6%	-15.6%	-10.2%	-3.8%

Sources and notes: 1. Spatial distribution of Black population: own calculation based on LTDB and NHGIS data. The sample contains census tracts in the 100 largest CBSAs, which had at least 10,000 Black residents in 1970.

their Black share of each census year in Panel C. Compared to Panel A and B, Panel C contains neighborhoods which became majority Black after 1960 or 1970, and thus the set of neighborhoods in Panel C changes between census years. Panel A shows how neighborhood composition changed in tracts that were majority Black right after the Fair Housing Act, while Panels B and C provide a robustness check by showing that the population change in Panel A is not the consequence of the choice of neighborhood definition.

Panel A of Table 2 shows that, on average, neighborhoods that had more than 50% Black share in 1970 experienced a large inflow of Black individuals between 1960-70. This trend reversed during the 1970s when the average number of Blacks in these tracts declined by 15.7%, after which the outmigration of Black families continued from these neighborhoods. By lowering the legal obstacles Black families faced during relocation, the Fair Housing Act could have supported this sudden change in Black neighborhoods during the 1970s.

The large number of non-Black individuals who left Black neighborhoods during the 1960s suggests that many of these neighborhoods experienced a quick change in their racial composition, which, in theory, could motivate Black families to leave these tracts. In general, it could be possible that Black neighborhoods experienced a large outflow of the Black population right after they became majority Blacks, which could also explain population changes in Panel A. However, as Panel B of Table 2 shows, counter to this explanation, neighborhoods that were already majority Black in 1960 experienced only a modest decline in Black population during the 1960s, but they went through similar depopulation during the 1970s as neighborhoods in Panel A. Panel C of Table 2, in which the sample of tracts contains all neighborhoods which were majority Black at the given census year, draws a similar picture by showing that the average number of Black population in Black neighborhoods declined the most in the 1970s. Panel B and C suggest that the large decrease in number of Black population in Black neighborhoods between 1970-80 was a result of a unique change in relocation behavior during the 1970s.

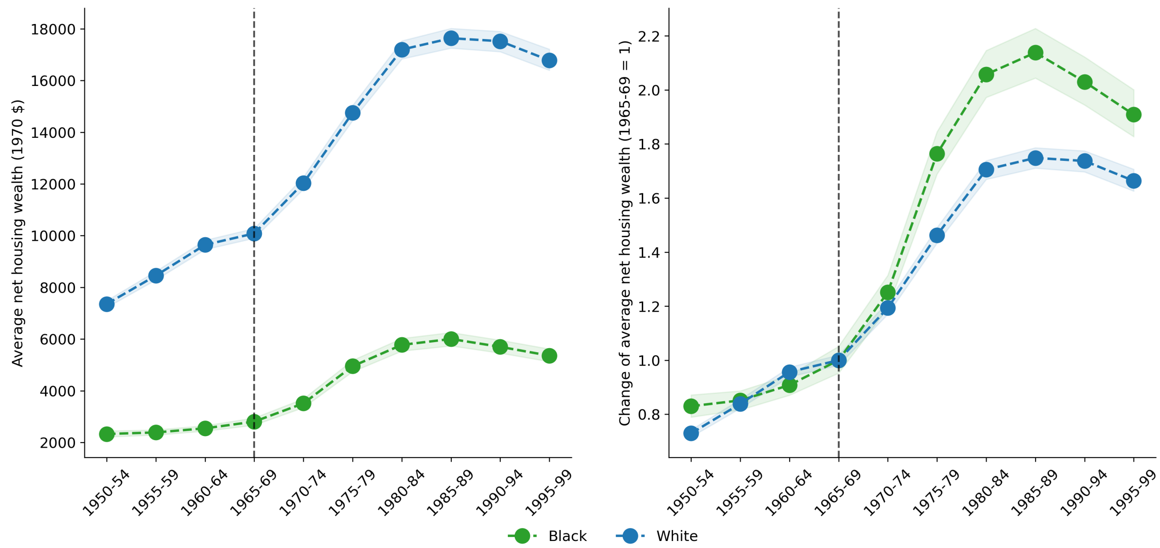
All three neighborhood definitions show that Black neighborhoods experienced a double-digit decline in the average Black population during the 1970s, while the decline continued but slowed down in the next decades. During the same time span, the Black population of the United States increased by 15-20% in each decade between 1960-2000, which makes the depopulation of Black neighborhoods even more dramatic. Interestingly, despite the declining Black population in these tracts, the decline of the average non-Black population reversed between 1980-1990, and Black neighborhoods experienced increasing non-Black presence during the 1990s.

Stylized fact III: Black families' housing wealth increased at a faster pace than Whites'

Differences in Black and White housing wealth have always been at the center of discussions about racial wealth inequality (eg. Shapiro, 2017; Rothstein, 2018). As housing asset dominates the asset portfolio of families in the middle of the wealth distribution (Aladangady and Forde, 2021), racial differences in housing wealth accumulation could create sizable differences in racial wealth inequality over time (Charles and Hurst, 2002). Meanwhile, net housing wealth is the wealth component that could have been the most likely affected directly by the Fair Housing Act. As the right panel of Figure A1 in the Appendix shows, the total net wealth of Black and White families increased at the same pace during the second part of the 20th century, while total non-house related wealth increased faster among Whites than Blacks (Figure A2). However, as the right panel of Figure 1 depicts, average net housing wealth increased at a much faster pace among Black families than among Whites right after the Fair Housing Act.

The left panel of Figure 1 illustrates that average White housing wealth rised rapidly between 1950-1980 when the nominal difference in average housing wealth between Black and White families increased. Compared to Whites, Black families' housing wealth accumulation

Figure 1: Evolution of average net housing wealth

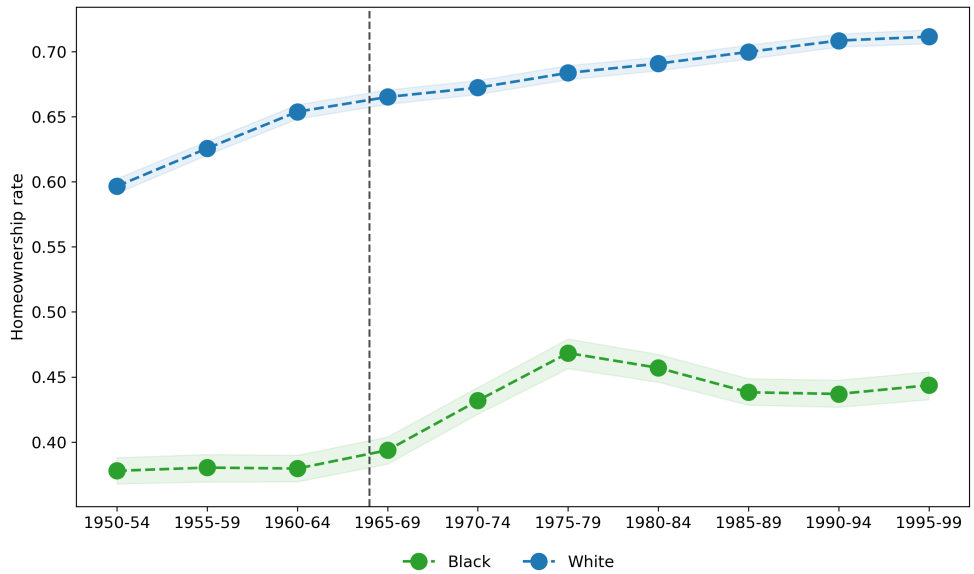


Source: own calculation, based on SCF+ data. Housing wealth is defined as asset value minus the remaining mortgage of the first residence. Transparent areas represent bootstrapped 95% confidence intervals.

was much slower until the 1970s, when it started to accelerate. The right panel of Figure 1, which shows how the average housing wealth changed compared to its 1965-69 value, indicates that during the 1970s, the average housing wealth of Black families increased at a faster pace than Whites', which was not the case in previous decades. As the decrease of nominal differences between Black and White average housing wealth requires faster housing wealth accumulation of Black families, Black families' larger housing wealth growth than Whites' in the 1970s could have been a first step to the long-run decline in racial differences in housing wealth. Thus, despite the continuously growing nominal differences between Black and White average housing wealth, the 1970s seemed to be a turning point in Black families housing wealth accumulation.

As the average net housing wealth is the product of the homeownership rate and the average net housing wealth of homeowners, we can decompose whether the fast rise of average Black net housing wealth was created by increasing homeownership (extensive margin), increasing net housing wealth of homeowners (intensive margin), or both. Figure 2 shows that Black homeownership rose rapidly during the 1970s but then declined somewhat, which could partly explain the slowdown of average Black housing wealth increase in the 1980s. Nevertheless, the expansion of the Black homeownership rate during the 1970s was the largest among any decades in the second part of the 20th century. White families' homeownership rate increased steadily at the same pace between 1960-2000, without any noticeable change

Figure 2: Black and White homeownership rate



Source: own calculation, based on SCF+ data. Transparent areas represent bootstrapped 95% confidence intervals.

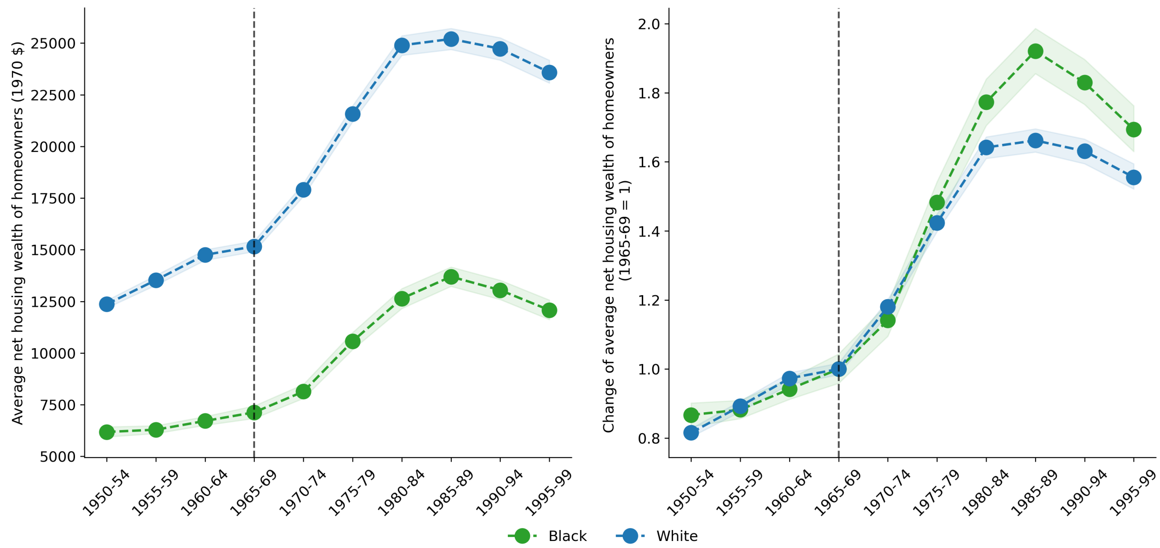
during the 1970s.

Meanwhile, as Figure 3 shows, during the 1970s, Black homeowners were able to accumulate housing wealth at a faster pace than in earlier decades. But, during the 1970s, the growth rate of average housing wealth of Black homeowners was nearly the same as Whites (right panel of Figure 3), and the nominal difference between the average housing wealth of Black and White homeowners continuously increased (left panel of Figure 3).

Thus, during the 1970s, the increasing nominal Black housing wealth in the left panel of Figure 1 was the byproduct of the quickly growing Black homeownership rate and the increased growth of the housing wealth of Black homeowners. However, as Black homeowners acquired housing wealth at the same pace as White homeowners, the fact that Black families accumulated housing wealth at a faster pace than Whites during the 1970s (right panel of Figure 1) caused by the decreasing racial differences in homeownership rate in the 1970s.

In summary, the 1970s were a favorable environment for housing wealth accumulation for Black families. Because of the existing racial differences, during this time, the nominal differences between average Black and White housing wealth increased. However, Black families accumulated housing wealth at a faster pace than Whites during the 1970s, which could have been the necessary first step to close the existing racial differences in housing wealth.

Figure 3: Evolution of average net housing wealth of homeowners



Source: own calculation, based on SCF+ data. Housing wealth is defined as asset value minus the remaining mortgage of the first residence. Prices measured in 1970 dollars. Transparent areas represent bootstrapped 95% confidence intervals.

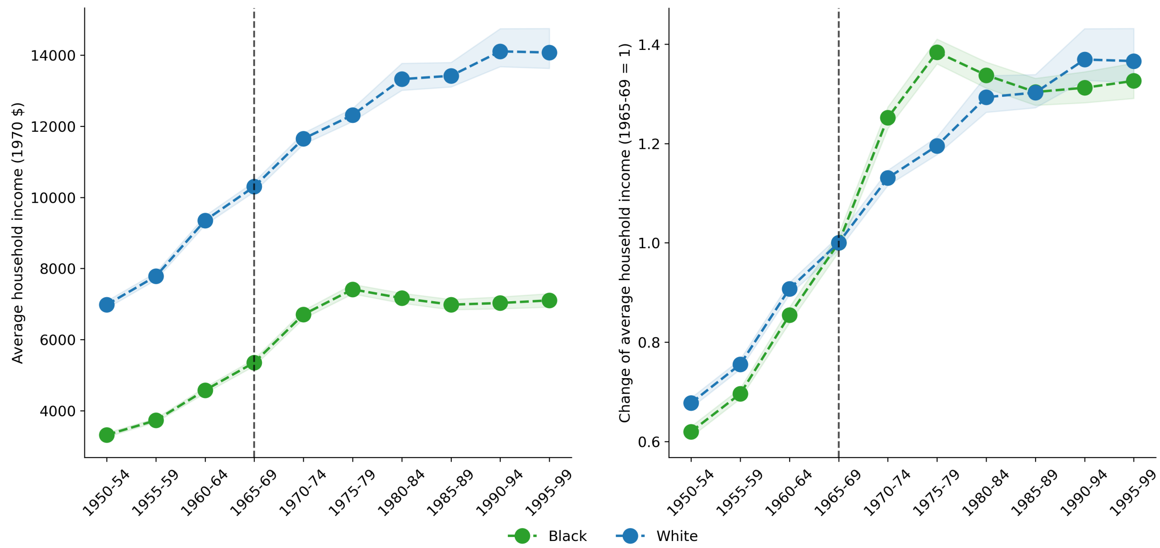
Can we draw a causal line between the FHA and these stylized facts?

The 1970s were a turning point in both the history of racial segregation and racial wealth inequality in the United States. The decades-long increase of racial segregation reversed, and since 1970, Black/non-Black racial segregation has been in constant decline. During the same time, Black families started to move out at an accelerated pace from majority Black neighborhoods, and Black families experienced a quickly increasing homeownership rate and faster housing wealth accumulation than Whites.

In this research I am interested in whether the Fair Housing Act could explain all of these three developments within one causal framework. By easing housing discrimination against Black families, the Fair Housing Act could have caused the sizable relocation of these families to more integrated neighborhoods (Stylized Fact II), which could explain the declining residential segregation (Stylized Fact I). Meanwhile, the new opportunities to accumulate housing wealth in more White neighborhoods could have motivated Black families to move there, become homeowners, and start to accumulate housing wealth (Stylized Fact III).

However, drawing a causal relationship between the FHA, these three stylized facts, and the evolution of racial wealth inequality would be questionable because of the changing economic environment over these decades. The Fair Housing Act was less likely to be able to explain the decline of both Black and White average housing wealth during the 1990s

Figure 4: Evolution of average household income



Source: own calculation, based on SCF+ data. Prices measured in 1970 dollars. Transparent areas represent bootstrapped 95% confidence intervals.

in Figure 1. Among other factors, the decreasing real total family income (Figure 4) could explain this drop, while the Fair Housing Act likely had a modest effect on family incomes. Similarly, the quickly increasing average Black total household income during the 1970s likely contributed to the increasing homeownership and housing wealth of Black families, and without further assumptions, we cannot distinguish the positive effect of increasing average Black household income on racial wealth inequality from the potential effect of decreasing segregation following the Fair Housing Act. Because of these difficulties, I investigate the potential effect of the Fair Housing Act on these three facts and on racial wealth inequality with a structural model, which enables me to quantify the effect of relocation of Black families following the FHA on racial wealth inequality by keeping all other relevant economic conditions unchanged.

3 Model

In this section, I introduce a quantitative structural model, that I use to quantify how the relocation of Black families affected the spatial sorting of Black and White households and how this relocation altered the Black-White wealth differences at different parts of the wealth distribution.

The model builds on a life-cycle heterogeneous agent OLG framework (similarly to De Nardi, 2004; Ashman and Neumuller, 2020; Brandsaas, 2021; or Chyn and Daruich, 2021), and generates wealth inequality through differences in life-time income and hand-to-mouth behavior. Agents in the model can endogenously relocate across three neighborhoods, which I estimate to represent White, Mixed, and Black neighborhoods. Unlike most models in the literature with spatial equilibrium (like Aliprantis and Carroll, 2018; Fogli and Guerrieri, 2019; or Chyn and Daruich, 2021), I model homeownership decisions directly, which allows me to model homeownership and location choice jointly and investigate whether the Fair Housing Act affected renters and homeowners differently. The house prices and rents in neighborhoods are endogenous and set in equilibrium, which generates house price change in neighborhoods in case of a changing population. Similarly to Aliprantis and Carroll (2018), I assume that some Black families are initially not allowed to move into the White neighborhood of the model.

3.1 Environment

Demographics The model is populated with overlapping generations of agents, who can be either Black or White ($R = \{B, W\}$, where R denotes race). Each period in the model can be interpreted as one year of life. Agents enter the model at age 24 in the neighborhood in which their grandparents resided. New agents inherit their parents' race, their time-invariant and race-dependent income fixed effect ρ_R, and bequest from their grandparents. Agents have one child, who enters the model when agents are 48 years old. Agents retire at age 60, from which point they receive a time-invariant pension income, but otherwise, their decision problem does not change. Agents leave the model after the period of age 72 when they could leave a bequest to their grandchildren, who inherit it at the next period when they enter the model.

Preferences In each period, agents gain utility from consuming consumption goods (c) and housing services ($v(h)$) and from neighborhood amenities by living in the neighborhood n

$$u(c, h, n)_R = \frac{(c^{1-\alpha} v(h_n)^{\alpha})^{1-\sigma}}{1-\sigma} + \kappa_{R,n} A_n,$$

where α is the expenditure shares of housing consumption, σ measures risk aversion, and A_n is a race-independent amenity level that represents the utility derived from living in neighborhood n. Parameter $\kappa_{R,n}$ is a race-dependent taste factor for living in neighborhood n, which allows Black and White agents to gain different utility by living in the same neighborhood. As a normalization, I set all three of White agents' $\kappa_{W,n}$ to 1. Just like in Brandsaas (2021), function $v(.)$ maps consumption of housing good in the neighborhood n to utility

$$v(h_n) = \begin{cases} \eta_{n,rent} & \text{if renting in neighborhood n} \\ \chi\eta_{n,own} & \text{if owning in neighborhood n} \ \ (\chi > 1) \end{cases}$$

where χ represents the additional utility derived from owning a house (like potential higher-quality or other benefits that are not explicitly modeled, such as tax benefits). In the model homeownership h is binary ($h = 1$ if the agent is a homeowner, and $h = 0$ if the agent is a renter), but the consumption value of housing good $v(h_n)$ is non-binary, and it differs among neighborhoods. At age 72, agents also derive utility from leaving non-negative bequests to their grandchildren, which following De Nardi (2004), takes the form of

$$beq(b', h', n') = \theta_{1,R}\left(1 + \frac{(1+i)b' + p'_{n'}h'(1-\delta)}{\theta_2}\right)^{1-\sigma} \quad \text{where} \quad b' \geq 0$$

where the race-dependent $\theta_{1,R}$ is capturing the parents' concern about leaving the bequest to their children, and the size of θ_2 controls in which the extent of the bequest is a luxury good. The nominator represents the wealth inherited by offspring: b is bond holding, i is the risk-free interest rate of bonds, p_n is the neighborhood-specific house price, h is an indicator for owning a house, and δ is the per-period depreciation of housing good.

Bequest connects generations in the model and allows agents to hold more wealth than would be possible just by their own income. In the model $\theta_{1,R}$, which controls how much utility agents gain by leaving bequests, is race-dependent for two reasons. First, the SCF+ shows significant racial differences in wealth at age 24 when agents enter the model: the median wealth holding of Black and White households at that age are \$0 and \$1,224, respectively. Second, previous research (Charles and Hurst, 2002; Ashman and Neumuller, 2020) highlighted that racial differences in parental involvement in down payments are an important source of the racial differences in the homeownership rate. As there are no in-vivos transfers in the model, racially differing bequest captures the existing racial differences in parental help in becoming a homeowner.

Neighborhoods There are three neighborhoods n in the model: Black, Mixed, and White. Neighborhoods differ in endogenous house prices p_n and rents q_n, in exogenous amenity levels A_n, and in consumption utility derived from owning $\eta_{n,own}$ or renting $\eta_{n,rent}$ in the neighborhood. Agents moving from neighborhood n to n' need to pay a relocation cost:

$$RC(n, n') = \begin{cases} k & \text{if } n \neq n' \\ 0 & \text{if } n = n' \end{cases}$$

I model the effect of the Fair Housing Act in the model through an exogenous relocation constraint F, which affects only Black agents. Agents with this constraint ($F = 1$) cannot move into the White neighborhood, while Black agents without this constraint ($F = 0$) – just as White agents – can choose from any neighborhoods to live in. I assume that π_F fraction of Black households living in the Black or Mixed neighborhood have this relocation constraint.

Housing market Agents can either rent or own a house. Neighborhood-level house prices are set in equilibrium by a supply function $S_n = \bar{S}_n p_n^{\Delta}$, where p_n is the equilibrium house price in neighborhood n, Δ is the price elasticity of housing supply, and $\bar{S_n}$ is a supply shifter. Housing assets depreciate between periods with a δ rate, and homeowners need to pay selling and buying cost $SBC(n, n')$ if their housing stock changes between periods:

$$SBC(h, h') = \begin{cases} e_s p_n & \text{if } h' < h \\ e_b p_n & \text{if } h' > h \\ 0 & \text{if } h' = h \ \& \ n' = n \end{cases}$$

where e_s and e_b are selling and buying costs, modeled as a fraction of the price. Agents with housing wealth do not need to pay selling or buying costs if they keep their house, but they need to pay both selling and buying costs in case they move into a different neighborhood and buy a house again. Households without housing assets need to pay rent q_n, which is a function of house price p_n.

Income process Active agents between the ages of 24-60 provide one unit of labor supply inelastically in each period. Their income endowment depends on their age, their race-dependent permanent income fixed effect ρ_R, and their race-dependent stochastic income shock ϵ_{ρ_R}. Retired agents between the ages of 60-72 receive a pension, which is a constant fraction of their pre-retirement wage. Agents need to pay progressive income tax $tax(y)$.

Financial market Each period agents can save in bonds b, which pays $(1 + i)b$ at the beginning of the next period. Agents can have negative bond holding to buy a house if they receive a mortgage, in which case agents owe $(1 + i^m)b$ at the beginning of the next period. Agents cannot hold mortgages and savings in bonds at the same time, and the rate of return on risk-free bonds is lower than the mortgage interest rate ($i < i^m$). The probability of receiving a mortgage in a given period is stochastic, and it depends on the income and race of the agent. At the beginning of each period, agents learn whether they can receive a mortgage ($\mu = 1$) or not ($\mu = 0$). To receive a mortgage, agents also need to satisfy an age-dependent debt-to-income (DTI) and loan-to-value (LTV) ratio, which means agents need to have enough savings first to be able to buy a house. Agents holding a mortgage are guaranteed to have access to a mortgage at the next period, but the actual amount of the next period's mortgage depends on their stochastic income at the next period. Agents need to pay back all of their mortgage loans at age 72, at the latest.

Hand-to-mouth (HtM) households To match the reality that a high fraction of Black households had wealth holding less than 2 weeks of their monthly income in 1970, the model contains hand-to-mouth agents, which is a time-invariant and inheritable trait. The only difference between hand-to-mouth ($HtM = 1$) and non-hand-to-mouth ($HtM = 0$) agents is their discount factor, which is lower for hand-to-mouth households; otherwise, hand-to-mouth agents face exactly the same decision problem as non-hand-to-mouth households.

3.2 Homeowners' recursive problem

To make households' decision problem more tractable, each variable without a comma (eg. n or age) represents a state variable, while variables with commas can be either a choice variable in the given period (c' is the optimal consumption in the given state) or next period state variables (eg. age'). I define homeowners as agents who decide to own a house in a given period ($h' = 1$), independently of their initial holding of housing units (h). Depending on agents' initial bond holding (b) and homeownership (h), their residence (n), their stochastic income shock (ϵ), and the possibility of receiving mortgage (μ), in each period agents decide how much to consume (c'), save in bonds (b'), whether to own a house (h') and where to live (n'). I model agents' decision problem in two steps: first, for each neighborhood, agents make their expected lifetime-utility maximizing consumption, saving, and house purchasing decision, and then they choose the utility-maximizing neighborhoods to live in. We can represent the recursive problem of an agent with race R, permanent income fixed effect ρ, hand-to-mouth condition HtM, and relocation barrier F who decides to own a house in a given period with the following equations:

$$V^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu) = \max_{c',b',h',n'} \Big\{u(c', h', n') + \beta_{HtM}\, \mathbb{E}\,[V^{R,\rho,F,HtM}(age', b', h' = 1, n', \epsilon', \mu')\ |\epsilon, \mu\ ]\Big\}$$

st.

$$y - tax(y) + b(1 + i^*) + p_n h(1 - \delta) = c' + p_{n'} h' + b' + RC(n, n') + SBC(h, h' = 1)$$

$$b' \geq \begin{cases} 0 & \text{if } \mu = 0 \text{ or } age' > 72 \\ max\{-LTV \times p_{n'} h'\ ;\ -DTI \times y \times (1 - (1 + i^m)^{-24})/i^m\} & \text{if } \mu = 1 \ \&\ age' \leq 72 \end{cases}$$

$$i^* = \begin{cases} i & \text{if } b \geq 0 \\ i^m & \text{if } b < 0 \end{cases}$$

$$V^{R,\rho,F}(age' > 72, b', h' = 1, n', \epsilon, \mu) = \theta_{1,R}\left(1 + \frac{(1 + r)b' + p_{n'} h'(1 - \delta)}{\theta_2}\right)^{1-\sigma}$$

3.3 Renters' recursive problem

Renters are defined as agents who decide to not hold housing wealth in a given period ($h' = 0$). Renters differ from homeowners in two important dimensions. First, these households need to pay rent q_n instead of living in their own house, which also means they do not transfer wealth across periods in housing wealth ($h' = 0$). Second, as borrowing is allowed in the economy only to finance a house purchase, they cannot choose a negative bond amount ($b' \geq 0$). Then, we can represent the recursive problem of an agent with race R, permanent income fixed effect ρ, hand-to-mouth condition HtM, and relocation barrier F who decides to rent in a given period with the following equations:

$$V^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu) = \max_{c',b',h',n'} \Big\{u(c', h', n') + \beta_{HtM}\, \mathbb{E}\,[V^{R,\rho,F,HtM}(age', b', h' = 0, n', \epsilon', \mu')\ |\epsilon, \mu\ ]\Big\}$$

st.

$$y - tax(y) + b(1 + i^*) + p_n h(1 - \delta) = c' + q_{n'} + b' + RC(n, n') + SBC(h, h' = 0)$$

$$b' \geq 0$$

$$i^* = \begin{cases} i & \text{if } b \geq 0 \\ i^m & \text{if } b < 0 \end{cases}$$

$$V^{R,\rho,F}(age' > 72, b', h' = 0, n', \epsilon, \mu) = \theta_{1,R}\left(1 + \frac{(1+r)b'}{\theta_2}\right)^{1-\sigma}$$

3.4 Stationary equilibrium

For a given house price vector P, a stationary equilibrium can be characterized with a collection of value functions $V^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu)$, a set of policy functions $c'^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu)$, $b'^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu)$, $h'^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu)$, and $n'^{R,\rho,F,HtM}(age, b, h, n, \epsilon, \mu)$, and distribution of households $\Omega_{age}(b, h, n, \epsilon, \mu, R, \rho, F, HtM)$, which satisfies the following conditions:

1. For house price vector P, the policy functions maximize all agents' expected lifetime utility.

2. Policy functions ensure spatial equilibrium, at which the housing market clears in each neighborhood at price vector P.

3. The state distribution of each cohort at any age is invariant over time.

4 Estimation

I estimate the model to match the spatial and wealth distribution of Black and White households observed in 1970. I interpret this steady state of the model as the "pre-segregation" era, assuming that most of the relocation of Black families, and thus the decline in residential segregation, took place after 1970, and not between 1968 (when the Fair Housing Act was enacted) and 1970. I make this assumption to be able to compute the spatial distribution of families by using the 1970 decennial census. This assumption seems to be reasonable based on Table 2, which shows that large-scale relocation of Black families from Black neighborhoods started in the 1970s and not during the 1960s.

During estimation, I used the census-tract-level aggregated 1970 Census data (LTDB and NHGIS), the 1969-71 waves of SCF+, and the 1968-74 waves of the Panel Study of Income Dynamics (PSID). As my census data contains only urban census tracts, I narrowed down the SCF+ sample to families that resided in metropolitan areas and in which the head was between the ages of 24 and 72. All calculations are weighted using sample weights (SCF+ and PSID) or the total population of tracts (1970 Census).

4.1 Parameters chosen outside of the model

Table 3 summarizes all relevant parameters estimated outside of the model.

Preferences Following the literature, I set the risk aversion parameter γ to 2, the discount factors $\beta_{HtM=0}$ to 0.96, and $\beta_{HtM=1}$ to 0.72 (Aguiar et al., 2020), and the expenditure share of consumption good α to 0.875 (Brandsaas, 2021). To simplify the estimation process, I set θ_2 parameter to 100. Similarly, I set the ratio of White hand-to-mouth agents as 12.14%, which is the fraction of White households holding less wealth than 2 weeks of income in the SCF+.

Income process I model the income process with three components. First, a deterministic age-dependent part ensures that household income follows a life-cycle trajectory observed in the data. Second, a time-invariant income fixed effect generates lifetime income inequality among households, which allows higher-income households to accumulate more wealth over time. Finally, a stochastic income shock term captures individual-level income shocks, which generate income uncertainty during the working age. Estimating the latter two components requires panel dimension, which, unfortunately, is lacking from the SCF+ dataset, which I use to target moments during estimation. To overcome this barrier, I estimate the income process in two steps.

First, using PSID, I estimate the following equation separately for Black and White households

$$log(y_{i,t}) = \beta_0 + \beta_1 age_{i,t} + \beta_{2,R} age_{i,t}^2 + \beta_3 age_{i,t}^3 + FE_i + e_{i,t}$$

where $y_{i,t}$ is total household income inflated into 1970 prices, the cubic polynomial of age is the life-cycle trajectory of the income endowment, FE_i is a fixed effect capturing the permanent income fixed effect, and $e_{i,t}$ is an error term. To calibrate the model's income fixed effect ρ_R, first I divide the sample into three terciles based on the predicted $\widehat{FE_i}$ parameters, and then I set the vector of ρ_R as the weighted mean of the predicted $\widehat{FE_i}$ parameters in these terciles. Then, I calibrate the temporary income shock parameter ϵ_{ρ_R} conditionally on ρ_R: within each $\widehat{FE_i}$ terciles I create three new tertiles based on $\widehat{e_{i,t}}$, and define the vector of ϵ_{ρ_R} as the weighted mean of $\widehat{e_{i,t}}$ in these new terciles. I assume that ϵ_{ρ_R} follows a Markov process with identical transition probabilities (1/3). Calibrating ϵ_{ρ_R} conditionally on ρ_R allows me to set heterogeneous income shocks by income fixed effect and race, which creates more realistic temporary shocks and income endowments. In the end, this calibration exercise yields three ρ_R and nine ϵ_{ρ_R} values for each race.

In the second step, using the SCF+ data, I regress household income on a cubic polynomial of age. I use the predicted parameters of this regression in the model instead of the ones estimated using PSID because it makes the model's income process fit better to the Black and White income distribution observed in SCF+. After retirement at age 61, agents receive a constant fraction of their age 60 income as pension, which fractions are 60.7% for Black and 70.6% for White households, estimated using the PSID.

I calculated income taxes using the 1970 income tax brackets of married couples filing jointly, which contained 25 marginal tax rates; I set the standard deduction to \$625. To make sure that all households can afford to pay rent, I set the after-tax minimum income in the model as the rent in the White neighborhood. Appendix B contains the estimated income parameters, the overall fit of the income processes, and the income tax brackets.

Mortgage market As Ladd (1998) shows, racial mortgage market discrimination was widespread during the 1960s and 1970s, but based on the 1970 Census of Housing (U.S. Bureau of the Census, 1973), the discrimination seemed to be more prevalent in the extensive margin (whether to get a mortgage) than in the intensive margin (mortgage conditions). The 1970 Census of Housing shows that mortgage conditions of Black applicants were quite similar to population averages in interest rate (6.1% vs. 6.0%), in duration (23.9 vs. 24.5 years), in debt-to-income ratio (11% to 9%), and in loan-to-value ratio at buying (86% vs. 78%, for conventional mortgages). Because of these similarities, I assume that Black and White households face the same mortgage conditions in the model, but the probability of receiving a mortgage differs by race.

I calculated the DTI ratio using the 1968-74 waves of PSID, as SCF+ doesn't contain information on yearly mortgage payments. The weighted mean of DTI of new purchases was 14.46%. I set the mortgage length as 24 years based on the 1970 Census of Housing. These two conditions, with the internally estimated mortgage rate, define a maximum amount of per-period annuity mortgage payment, from which I can calculate the maximum amount of mortgage in the model. LTV ratio also defines an additional restriction on the maximum amount of mortgage, which I calculated using the SCF+. In the model, I assumed that LTV is age-dependent, and I calculated the LTV ratios as the predicted cubic polynomial of age (illustrated in Figure A4). Because of this assumption, agents cannot hold a high LTV ratio over their lifetime, which makes their life-cycle saving decisions more realistic. I assume that the probability of receiving a mortgage is in the form of

$$P_{i,R}(\mu' = 1|\mu = 0) = min\Big(\frac{y_i}{y_{75}}\psi_R; 1\Big); \quad P_{i,R}(\mu' = 1|\mu = 1) = 1$$

where y_i is an agent's income, y_{75} is the 75th percentile of household income from SCF+, and ψ_R is a race-dependent discount factor. This functional form guarantees that agents with mortgages will have access to mortgages in the future, that the probability of getting a mortgage increases with income, and for most income levels Black agents are less likely to receive mortgages. Using mortgage application data from the late 1970s, Schafer & Ladd (1981) found that Black applicants were 1.58–7.82 times as likely to be rejected as Whites with similar observable characteristics. Using this study I set $\psi_B = 1/1.58 = 63.29\%$ for Black agents, while as a normalization I define $\psi_W = 1$ for Whites.

Neighborhoods I use the census tract level 1970 Census to calculate neighborhood characteristics. I map census tracts to my 3 neighborhood categories (White, Mixed, and Black) based on the share of Black individuals in a given tract in 1970. I categorize a neighborhood as White if the Black share was less than 10 percent, Mixed if its Black share was between 10 and 50 percent, and Black if its Black share was at least 50 percent in 1970.

I defined the consumption value of housing in neighborhoods ($\eta_{n,own}$ and $\eta_{n,rent}$) as the average number of rooms in each neighborhood/tenure cell. I set the relocation cost k to \$150, which was the average renting cost of a moving truck for a day in 1970. To make the model estimation more tractable, as a normalization, I set the race-neutral amenity of households living in the White neighborhood (A_W) as -0.000250. I normalize the three race-dependent neighborhood taste parameters of White agents ($\kappa_{W,W}$, $\kappa_{I,W}$, $\kappa_{B,W}$) to 1, and I assume that Black households gain 10 percent less utility from living in the White neighborhood than White families, which yields $\kappa_{B,W} = 1.1$. This assumption is in line with the finding of the 1976 wave of the Detroit Area Study (Farley and Schuman, 1984) and Aliprantis et al. (2024), which studies found that, all else equal, Black households prefer to reside in Mixed and majority Black neighborhoods over majority White ones. I estimate the remaining two race-independent neighborhood amenities (A_M, A_B) and two race-dependent neighborhood taste parameters ($\kappa_{M,B}$, $\kappa_{B,B}$) within the model. Following Gordon (2023), I set π_F, the fraction of Black households living in the Black or Mixed neighborhood who are

Table 3: Externally estimated parameters

Parameter		Value	Source
Preferences			
Risk aversion	γ	2.0	Standard
Discount factor (non-hand-to-mouth)	$\beta_{HtM=0}$	0.96	Aguiar et. al. (2023)
Discount factor (hand-to-mouth)	$\beta_{HtM=1}$	0.72	Aguiar et. al. (2023)
Expenditure share of consumption	α	0.825	Brandsaas (2021)
Bequest parameter (simplifed)	θ_2	100	
Share of White HtM agents		0.1214	SCF+
Utility from housing good: Owners	$\eta_{W,own}/\eta_{M,own}/\eta_{B,own}$	5.83/5.60/5.60	1970 Census
Utility from housing good: Renters	$\eta_{W,rent}/\eta_{M,rent}/\eta_{B,rent}$	4.33/4.18/4.14	1970 Census
Neighborhoods and housing market			
Housing deprecation	δ	0.025	Standard
House selling/buying cost	e_s/e_b	0.075/0.025	Brandsaas (2021)
Price elasticity of housing supply	Δ	1.37	Saiz (2010)
House price: White neigh.	p_W	\$22,198	1970 Census
House price: Mixed neigh.	p_M	\$16,339	1970 Census
House price: Black neigh.	p_B	\$13,567	1970 Census
Rent parameters: Intercept (W/M/B)		\$659/\$527/\$465	1970 Census
Rent parameters: Slope (W/M/B)		3.35%/2.85%/3.65%	1970 Census
Relocation cost	k	\$150	see text
Share with relocation barrier	π_F	0.5	see text
Mortgage and financial market			
Risk-free rate	i	0.02	Standard
Loan-to-value ratio	LTV	see text	SCF+
Debt-to-income ratio	DTI	0.1446	PSID
Mortgage length		24 years	1970 Census of Housing
Black mortgage discrimination	ψ_B	0.6329	Schafer & Ladd (1981)
75th percentile of household income (1970)	y_{75}	\$13,580	SCF+

not allowed to move into the White neighborhood, to 50%.

Housing market I set neighborhood-level house prices p_n as the average of median house prices in census tracts. Following Brandsaas (2021), I set the selling cost of a home property e_s to 7.5% percent of the price, and the buying cost e_b to 2% of the price. House value deprecates with $\delta = 2.5\%$ between periods. The housing supply is modeled as

$$S_n = \bar{S}_n p_n^{\Delta}$$

where I set Δ as 1.37, which is the population-weighted mean of house supply elasticities of cities in my sample, originally calculated by Saiz (2010). S_n is the fraction of household living in neighborhood n, which is defined by the spatial equilibrium. I calculate the supply shifter parameter $\bar{S}_n$ to make sure that at spatial equilibrium, the equilibrium house prices p_n are equal to house prices computed from the 1970 Census. I calibrate rent in different neighborhoods by estimating the $rent_{i,n} = \beta_0 + \beta_1 p_{i,n} + \varepsilon_i$ equation in the three neighborhood types separately, using tract-level median home prices and rents from the 1970 census. Then, I set neighborhood-level rent q_n using the estimate parameters as $q_n = \widehat{\beta}_0 + \widehat{\beta}_1 p_n$, where p_n is the equilibrium house price of the model.

4.2 Parameters identified within the model

I jointly estimate the 8 remaining parameters of the model by targeting 8 moments with the method of simulated moments. I estimate the remaining two race-independent neighborhood amenities (A_I, A_B) and two race-dependent neighborhood taste parameters ($\kappa_{I,B}$, $\kappa_{B,B}$) within the model, and I identify them with four moments targeting the spatial distribution of Black households in White and Mixed, and White households in Mixed and Black neighborhoods. During estimation, I assumed that agents gain the highest utility by living in the White and lowest utility by living in the Black neighborhood of the model (thus, $A_W > A_I > A_B$), which reflects the existing differences in house prices and rents. Then, I identify the homeownership premium χ and the mortgage rate i^m parameters by targeting the Black and White homeownership rate. Finally, I target the final two moments, the median of the Black and White wealth distribution, with the ratio of Black hand-to-mouth agents and with the White agents' bequest parameter $\theta_{1,W}$. I define Black agents' bequest parameter $\theta_{1,B}$ as one-tenth of $\theta_{1,W}$, as based on SCF+ the median of Black wealth distribution at age 20-24 – when agents enter the model with inherited wealth – was zero.

I estimate the model with simulated annealing, which minimizes the weighted squared distance of the simulated and empirical moments:

$$\mathbf{d}' \, \mathbf{W} \, \mathbf{d}$$

where $\mathbf{d}$ is a vector containing the squared difference of the simulated and empirical moments, and $\mathbf{W}$ is a weighting matrix. The weighting matrix contains the inverse of the empirical moments' bootstrapped variance in the diagonal and zeros in any other places. Table 4 presents the estimated parameter values and the difference between the simulated and empirical moments.

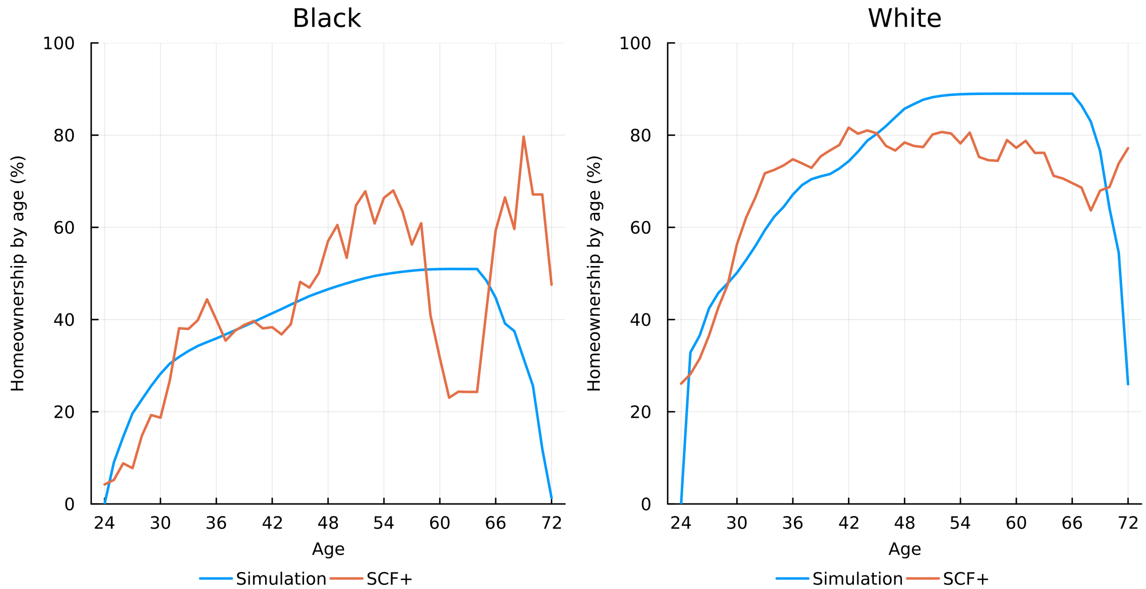
Table 4: Internally estimated parameters and model fit

Description	Parameter	Value	Moment	Model	Data
Spatial equilibrium					
Amenity of living in M neigh.	A_M	-32.1e-5	% B living in White neigh.	7.80%	7.29%
Amenity of living in B neigh.	A_B	-36.5e-5	% B living in Mixed neigh.	21.97%	21.53%
Neigh. taste param, B living in M neigh.	$\kappa_{B,M}$	0.8848	% W living in Mixed neigh.	9.19%	9.64%
Neigh. taste param, B living in B neigh.	$\kappa_{B,B}$	0.7940	% W living in Black neigh.	1.70%	2.08%
Mortgage market and homeownership					
Homeownership premium	χ	1.035	B homeownership rate	38.0%	38.3%
Mortgage rate	i^m	4.1%	W homeownership rate	71.9%	69.2%
Bequest & HtM					
Share of hand-to-mouth, B		45%	B median wealth	\$1,257	\$1,237
Bequest parameter, W	$\theta_{1,W}$	-0.00425	W median wealth	\$14,658	\$15,119

The estimated race-dependent neighborhood taste parameters reflect that, compared to Black agents, Whites gain $1/0.8848-1 = 13.0\%$ less utility by living in the Mixed and 25.9% less utility by living in the Black neighborhood. The estimated homeownership premium's magnitude is in line with the literature (eg. 1.015 in Kaplan et al. (2020), and 1.379 in Brandsaas (2021)), while the mortgage premium ($i^m - i = 2.1\%$) is a little bit higher than in other papers (eg. 0.9% in Brandsaas (2021)). Table 4 shows that the model matches most of the targeted moments quite closely. The simulated fractions of Black and White households living in different neighborhoods are within 0.5 percentage points of the targeted moments. The model matches the Black homeownership rate and median wealth moments well, while the median White wealth is nearly 3% lower than the targeted moment, despite that the generated White homeownership is 2.5 percentage points higher than in the data. Despite these differences, the simulated Black–White wealth gap at the median in the model is 11.7, which is close to the 12.2 ratio observed in SCF+.

To be able to run simulations, I set the $\bar{S_n}$ shift parameters in the model. Following Chyn and Daruich (2021), I use the estimated spatial distribution of households in the model to define the demand for housing, which is the fraction of households living in neighborhood n. In spatial equilibrium, the housing market clears, and the housing supply S_n should be equal to the demand for housing, which allows me to calculate the supply shift parameters $\bar{S_n}$ using the spatial distribution of agents in the model and the 1970 house prices observed in the data. The calculated supply shift parameters guarantee that the model economy is in spatial equilibrium with the relocation barrier at the empirically observed house prices.

Figure 5: Model fit: Homeownership over the life-cycle



Source: own simulation and own calculation using SCF+. SCF+ data is moving averages (MA5) of homeownership rate at each age.

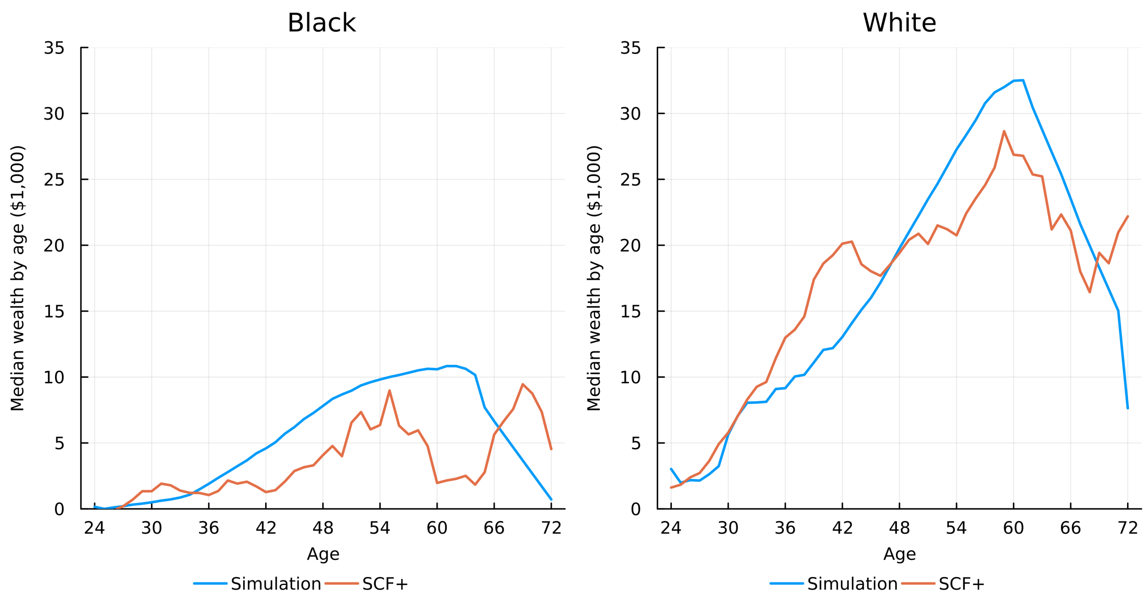
4.3 Model fit

The model intends to capture how spatial sorting and homeownership affect households' wealth holding. Table 4 showed that the spatial distribution, the homeownership rate, and median wealth holding of both Black and White families of the estimated model fit well with the empirical counterparts. Figures 5 and 6 illustrate that in the estimated model the evolution of homeownership and median wealth over the life-cycle are also close to the observed life-cycle profiles in the SCF+.

As Figure 5 shows, the model generates a realistic homeownership pattern for both Black and White agents. The model captures the fact that Black families' homeownership rate constantly increases over the life-cycle, while the drop in homeownership in the model after age 66 is the result of the certainty that agents leave the model at age 72. Meanwhile, the model captures the quick increase of the White homeownership rate at young age and the relatively flat homeownership rate between age 45-60.

As Figure 6 shows, the model generates slightly higher median Black wealth holding over the life-cycle than we can observe in the data. Meanwhile, the model generates a realistic wealth pattern over the life-cycle for White families. Compared to the empirical median

Figure 6: Model fit: Median wealth over the life-cycle



Source: Own simulation, own calculation using SCF+. SCF+ data is moving averages (MA5) of median wealth at each age.

wealth holding at the SCF+, the model slightly underpredicts wealth accumulation between ages 30-48 and overpredicts it between ages 48-60. However, the model captures the fact that the wealth holding of White families peaks around age 60, and then it starts to decline quickly.

5 Simulations

I use this estimated model to simulate whether the Fair Housing Act could recreate the stylized facts I presented and to quantify how the FHA affected racial wealth inequality. I simulate the effect of the FHA by lifting up the relocation barrier in the model economy, which affects π_F fraction of Black families living in Mixed or Black neighborhoods. Black families affected by this relocation friction could prefer to move into the White neighborhood for at least two reasons. First, the amenity level Black agents experience in the White neighborhood ($\kappa_{B,W} A_W$) is higher than in the Mixed ($\kappa_{B,M} A_M$) or in the Black ($\kappa_{B,B} A_B$) neighborhoods; otherwise, no Black agent would prefer to live in the White neighborhood, where the house price and rent are higher. Second, the consumption value of housing goods is also higher in the White neighborhood than in the Mixed and the Black, for both renters and

Table 5: Overview of the effect of the FHA in the model economy

	Before FHA	After FHA	Change
Spatial distribution			
Fraction of Black agents living in			
White neighborhood	7.8%	13.8%	+6.0pp
Mixed neighborhood	22.0%	18.4%	–3.6pp
Black neighborhood	70.2%	67.8%	–2.4pp
Fraction of White agents living in			
White neighborhood	89.1%	88.3%	–0.8pp
Mixed neighborhood	9.2%	9.7%	+0.5pp
Black neighborhood	1.7%	2.0%	+0.3pp
Racial residential segregation			
Dissimilarity index (Black/White)	0.813	0.745	–0.068
Equilibrium house price in			
White neighborhood	\$22,198	\$22,214	+\$16
Mixed neighborhood	\$16,340	\$16,294	–\$44
White neighborhood	\$13,567	\$13,531	–\$36
Average housing wealth			
Black	\$4,967	\$5,278	+\$311
White	\$12,576	\$12,642	+\$66
Homeownership			
Black	38.0%	38.1%	+0.1pp
White	71.9%	72.3%	+0.4pp
Average housing wealth of homeowners			
Black	\$13,073	\$13,864	+\$791
White	\$17,499	\$17,493	–\$6
Wealth inequality (Gini index)			
All families	47.44%	47.30%	–0.14pp
Black families	68.22%	68.42%	+0.20pp
White families	44.06%	43.91%	–0.15pp

owners (Table 3). As house prices and rents are more expensive in the White neighborhood, Black agents need to forgo consuming consumption goods to pay the higher price of living there. Because of this forgone consumption, some Black agents with lower consumption levels might prefer to stay in the Mixed or the Black neighborhood, as the utility loss of moving and consuming less consumption goods could exceed the utility gain from higher amenity levels and higher housing service consumption. This is unlikely for high-income Black agents with higher consumption levels, for whom the net effect of moving on utility could be positive. Because of this, the end of housing discrimination in the model does not affect all Black agents equally, and only higher-income Black agents are expected to move into the White neighborhood.

By lifting the relocation friction through the Fair Housing Act in the model, previously constrained higher-income Black agents start to move into the White neighborhood, which creates increasing house prices and rents in neighborhoods that gain new residents and declining house prices and rents in neighborhoods that lose population. Then, the changing house prices could motivate previously unconstrained Black and White families to move. In this way, the relocation of constrained Black families has a spillover effect on other families. At the end of this relocation process, the model reaches a new spatial equilibrium, at which no agent prefers to move at the equilibrium house prices. I quantify the effect of the Fair Housing Act on spatial sorting and racial wealth inequality by comparing the spatial and wealth distribution of this new steady state to the original state with relocation friction.

I compare the quantitative results of the simulations to the empirical changes in spatial distribution and housing wealth observed between 1970-80. I chose this comparison period for two main reasons: first, this is the shortest period following the Fair Housing Act with two decennial censuses, which is the data source of the spatial distribution of Blacks and Whites. Second, the model is estimated to match the economic conditions observed in 1970, and choosing a longer comparison period than 1970-80 would allow more changes in these conditions, which would have created a less realistic counterfactual comparison for simulation results. The goal of the model is to quantify the effect of the Fair Housing Act by keeping all other relevant economic factors unchanged; thus, comparing the model's simulation results to observed empirical changes becomes less and less realistic as we increase the time span.

As important economic factors other than the Fair Housing Act, like the real value of average total family incomes (Figure 4), also changed during the 1970s, the simulation results do not need to overlap with the observed changes in spatial distribution and housing wealth. The difference between the simulated and observed aggregates is informative in determining whether the decreasing segregation and the quickly increasing Black housing wealth is the consequence of the Fair Housing Act or the consequence of other economic changes in reality that are not incorporated directly in the model.

5.1 FHA's effect on spatial sorting

As Table 5 summarizes, the lift of the relocation barrier, which prevented some Black households from entering the White neighborhood of the model, increases Black presence in the White neighborhood. In the new spatial equilibrium of the model, the fraction of Black households living in the White neighborhood increases from 7.8% to 13.8%, primarily because previously constrained Black households move out from the Mixed and Black to the White neighborhood. As a result, the share of Black families living in the Mixed and Black

Table 6: Relocation across neighborhoods: Model vs. Data (1970-80)

	White neigh.	**Mixed neigh.**	**Black neigh.**
Panel A: Change in spatial distribution – Simulations			
Black agents	+6.0pp	–3.6pp	–2.4pp
Homeowners	*+4.4pp*	*–2.0pp*	*–2.3pp*
Renters	*+1.6pp*	*–1.6pp*	*–0.1pp*
White agents	–0.8pp	+0.5pp	+0.3pp
Homeowners	*+0.1pp*	*+0.0pp*	*+0.3pp*
Renters	*–0.9pp*	*+0.5pp*	*+0.0pp*
Panel B: Change in spatial distribution – Census, based on population change			
Black population	+3.0pp	+1.1pp	–4.2pp
White population	–2.3pp	+2.1pp	+0.1pp
Panel C: Change in spatial distribution – Census, based on occupied housing units			
Housing units occupied by Blacks	+3.0pp	+0.7pp	–3.7pp
Homeowners	*+0.4pp*	*–0.7pp*	*+2.2pp*
Renters	*+2.6pp*	*+1.5pp*	*–6.0pp*
Housing units occupied by Whites	–2.7pp	+3.1pp	–0.4pp
Homeowners	*–1.6pp*	*+1.9pp*	*–0.1pp*
Renters	*–1.1pp*	*+1.2pp*	*–0.3pp*

Notes: In census data White population contains both Hispanic and non-Hispanic Whites. Neighborhoods are defined based on the Black share observed in 1970 for the 1970 census and based on the Black share in 1980 for the 1980 census.

neighborhoods decreases by 3.6 and 2.4 percentage points, respectively. Meanwhile, because of the relocation of Black families, house prices decrease in Mixed and Black neighborhoods, which motivates White families to move there. As a result, the fraction of White families living in the White neighborhood decreases by 0.8 and increases in the Mixed and Black neighborhoods by 0.5 and 0.3 percentage points, respectively. Because of the countermovement of White families into Mixed and Black neighborhoods, the fraction of agents living in each neighborhood remains relatively unchanged, and the change in equilibrium house prices is modest.

Table 6 compares the change of spatial distribution of Black and White agents in the model to the observed change of two different distributions from the census. Panel B shows how the distribution of the Black and White population changed between 1970-80 in White, Mixed, and Black neighborhoods,[4] which is a reliable comparison to the simulated changes in Panel A. The spatial distributions of renter and homeowner families are not available in the census, only the distribution of housing units that were occupied by Black or White families. Panel C illustrates how the spatial distribution of housing units changed by race

[4]Neighborhoods are defined based on Black share observed in 1970 for the 1970 census, and based on the Black share in 1980 for the 1980 census.

and tenure, which could be informative in determining whether homeowners or renters were more likely to move. In Panel A and C, agents and housing units are divided into renters and homeowners, and the sum of the percentage point changes in homeowners and renters should add up to the total changes.[5] Similarly, the total changes in the spatial distribution of Blacks and Whites should add up to zero among neighborhoods.[6]

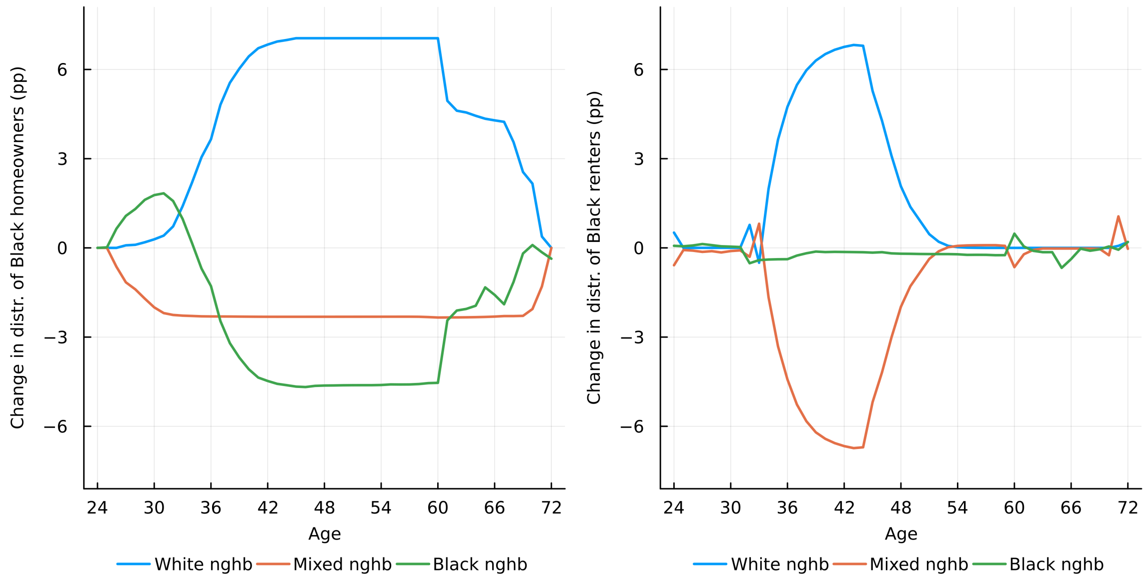
As more than one family could have stayed in one housing unit, the two different measures of spatial distribution change in Panel B and C in Table 6 are different, but they depict the same main patterns. Both measures suggest that, between 1970 and 1980, the share of Black families living in White and Mixed neighborhoods increased, while the share of Whites living in Mixed neighborhoods increased by almost the same magnitude as the fraction of Whites decreased in White neighborhoods. The only bigger difference between Panel B and C is the change in the share of the White population and housing units residing in Black neighborhoods. Even if the share of housing units occupied by White households decreased by 0.4 percentage points in Black neighborhoods (in Panel C), the share of Whites living in these neighborhoods increased by 0.1 percentage points (in Panel B).

Comparing simulation results in Panel A with the observed changes in the spatial distribution of Blacks and Whites in Panel B reveals that the Fair Housing Act could explain the direction of changes in the spatial sorting of Blacks and Whites. Simulation results suggest that, because of the Fair Housing Act, Black families relocated from Black to White neighborhoods, while the FHA also explains why the share of Whites living in White neighborhoods decreased and their share in Mixed and Black neighborhoods increased. Compared to the observed change in spatial distribution, the model predicts a lower level of White relocation from White to Mixed neighborhoods and higher Black relocation to White neighborhoods. Also, in the model, Black presence decreased in Mixed neighborhoods because of the Fair Housing Act, while in reality, the share of Blacks living in Mixed neighborhoods increased between 1970-1980. The source of these differences could be the unmodeled economic changes during the 1970s, or the possibility that neighborhoods could have become Mixed from White as Black families moved there, which the model cannot capture because

[5]For example, Panel A shows that the share of Black families living in the White neighborhood increased by 6 percentage points. Out of these 6 percentage points, the increasing share of Black homeowners living in White neighborhoods explains 4.4 percentage points, and the increasing presence of Black renters in the White neighborhood contributed by 1.6 percentage points.

[6]For example, in Panel A, the share of Black agents living in the White neighborhood increased by 6 percentage points and decreased by 3.6 percentage points in the Mixed and 2.4 percentage points in the Black neighborhood. These changes should add up to zero (+6pp–3.6pp–2.4pp=0pp), or almost zero in case of rounding errors.

Figure 7: Change of spatial distribution of Black agents over the life-cycle, by homeownership



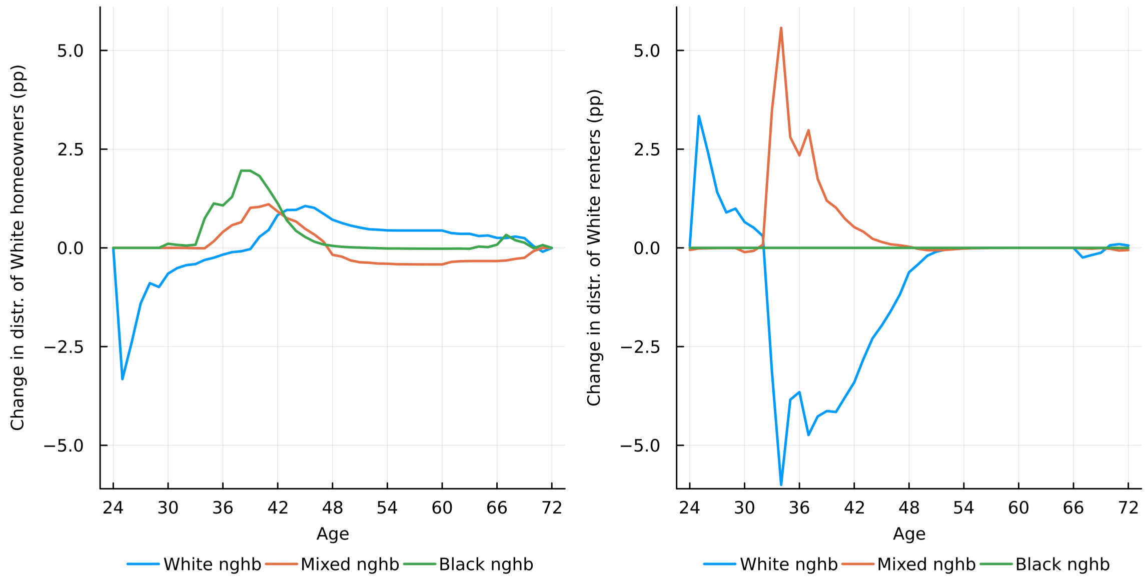
Source: Own simulation.

of the limited number of neighborhoods.

Another possible explanation could be the ongoing difficulties Black families experienced during buying homes in White neighborhoods. In the simulations, after the FHA, Black families faced no barriers to purchasing homes in the White neighborhood, and most of the relocation of Black families was driven by homeowners who decided to own a home in a White neighborhood instead of a Mixed or Black neighborhood of the model. As Panel C in 6 suggests, in reality, most Black relocation was driven by renters instead of homeowners, and most of the increase in Black homeownership took place in Black neighborhoods. The decrease in the share of units rented by Blacks (–6.0pp) is almost as large as the increase in the share of units rented in White and Mixed neighborhoods (+2.6pp and +1.5pp) and owned in Black neighborhoods (+2.2pp) by Black families. The observed change in the distribution of Black-occupied housing units suggests that Black families faced fewer difficulties moving into more integrated neighborhoods as renters, while in the model, Black renters and homeowners face the same constraint moving into the White neighborhood.

The Fair Housing Act had a sizable effect on housing wealth through Black and White agents' location and homeownership decisions in the model. Figures 7 and 8 illustrate how FHA changed the spatial distribution and homeownership decision of agents over the life-

Figure 8: Change of spatial distribution of White agents over the life-cycle, by homeownership



Source: Own simulation.

cycle. The right panel of Figure 7 shows that the FHA mainly affected Black renters' spatial distribution in the middle of agents' lives, as previously constrained Black agents moved into the White neighborhood from the Mixed neighborhood of the model. Because of the unconstrained relocation following the FHA, many previously constrained Black homeowners moved from the Mixed and Black neighborhood into the White, but following retirement at age 60, many of these Black homeowners moved back to the Black neighborhood and consumed some part of the previously accumulated wealth.

Meanwhile, as Figure 8 shows, the spillover effect of Black agents' relocation had a sizable effect on White agents' location and homeownership decisions in the first part of their lives. Following the FHA, house prices and rents increased in the White and decreased in the Mixed and Black neighborhoods of the model. This motivated some White families to postpone homeownership in the White neighborhood at the beginning of their lives and become homeowners in the Mixed and Black neighborhoods. In the end, as the decreased share of White homeowners in the Mixed and their increased share in the White neighborhood suggest, some White homeowners were able to replace their home in the Mixed with a home in the White neighborhood in the second part of their lives. These agents were able to accumulate more housing wealth than before the FHA, which increased both White agents' average housing wealth and homeownership rate (Table 5).

5.2 Could FHA have caused the three stylized facts?

To determine whether the Fair Housing Act caused the three stylized facts I presented in Section 2, I compare the simulated changes in spatial distribution and housing wealth in the model to the observed empirical changes between 1970-80. Choosing this short time window right after the FHA gives realistic but not perfect comparisons, as counter to the model economy, economic conditions changed in the real world.

Stylized Fact I: Decline of residential segregation

In line with the sizable changes in the spatial distribution of Black agents and the countermovement of Whites, the dissimilarity index between Black and White families decreased from 81.3% to 74.5% in the model (Table 7). The 6.8 percentage point decline of the dissimilarity index is just slightly higher than the 6.1 percentage point decline observed in the data between 1970-80. This suggests that, by easing the relocation barriers Black families faced while moving to White neighborhoods, the Fair Housing Act could explain the start of residential segregation's decline during the 1970s.

Stylized Fact II: Black families started to leave Black neighborhoods

As Table 7 summarizes, the Fair Housing Act decreased the share of Black agents residing in the Black neighborhood of the model. The observed decline in the share of Blacks residing in Black neighborhoods (4.1 percentage points) was larger than the model prediction (2.4 percentage points), which suggests that in reality factors not directly incorporated in the simulations prevented Black families from moving to White neighborhoods. However, the simulation results imply that the Fair Housing Act increased the outmigration of Black families from Black neighborhoods.

Stylized Fact III: Black families' housing wealth increased at a faster pace than Whites'

Figure 1 in Section 2 shows that even if the nominal differences in Black and White average housing wealth increased during the 1970s (left panel), the growth rate of Black

Table 7: Stylized facts: Model vs. Data

	Data (1970-80)	Simulation
Stylized fact I: Decline of racial segregation		
Dissimilarity index (Black/non-Black)	–6.1pp	–6.8pp
Stylized fact II: Black families started to leave Black neighborhoods		
Change in the share of Black families living in Black neighborhoods	–4.1pp	–2.4pp
Stylized fact III: Black housing wealth increased at a faster pace than White		
Racial difference in avg. housing wealth growth (Black – White)	+30.2pp	+5.7pp
Change of racial gap in homeownership (Black – White)	+5.6pp	–0.3pp
Racial difference in avg. housing wealth growth of homeowners (Black – White)	+5.1pp	+6.3pp

housing wealth was higher than White (right panel), which is the first necessary condition to close the racial gap in nominal housing wealth differences in the long run. As Table 7 summarizes, the difference between the growth rate of Black and White average housing wealth between 1965-69 and 1975-79 (right panel of Figure 1) was 30.2 percentage points. In the model, the FHA increased the average Black and White housing wealth by 6.26 and 0.52 percentage points, respectively, which yields a 5.7 percentage point difference in racial housing wealth growth. Thus, the simulation results suggest that the Fair Housing Act increased Black housing wealth at a faster pace than that of Whites', and the magnitude of the FHA's direct effect is almost a fifth of the observed racial difference in housing wealth growth rate.

We can divide the change in average housing wealth into the change in homeownership rate and the change in average housing wealth of homeowners. This distinction reveals that in the model, Black housing wealth increased faster than White because Black homeowners increased their housing wealth more than White homeowners. Following the FHA in the model, many Black families decided to own homes in White instead of Mixed and Black neighborhoods (see Figure 7), which increased their housing wealth. Meanwhile, the average housing value of White homeowners slightly decreased in the model, primarily because 0.3% of White agents switched from being renters in the White neighborhood to becoming homeowners in the cheaper Black neighborhood (Table 6). As a result, in the model the growth rate of Black homeowners's housing wealth was 6.3 percentage points higher than White homeowners', which is quite similar to the observed difference in the data (+5.1 percentage points).

In the model, the Fair Housing Act increased the White homeownership rate (+0.4pp) at a faster pace than the Black homeownership rate (+0.1pp); as a result, racial differences in homeownership rate increased by 0.3 percentage points due to the FHA in the model. In reality, the Black homeownership rate increased at a faster pace than the White (see Figure 2), and racial differences in homeownership rate decreased by 5.6 percentage points. The simulation results suggest that the observed large decline in racial homeownership difference was not the direct effect of the Fair Housing Act but other favorable changes in economic conditions (like increasing real incomes).

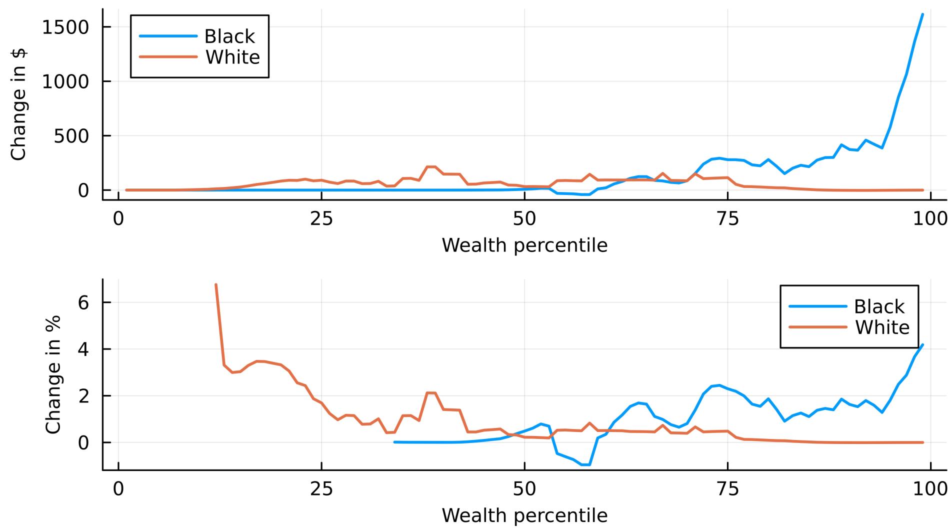
All in all, my simulation results suggest that the Fair Housing Act decreased racial differences in average housing wealth, but not at the magnitude observed in the SCF+. However, as the closing gap was the result of relatively wealthy Black homeowners' relocation from the Mixed and Black neighborhood to the White one, the decreasing racial differences in housing wealth might not imply decreasing racial wealth inequality in most parts of the wealth distribution.

5.3 FHA's effect on racial wealth inequality

Finally, I quantify the effect of the Fair Housing Act on racial wealth inequality by comparing the change in the steady state of Black and White wealth distributions. Figure 9 illustrates how the wealth holding changes at a given percentile of the Black and White wealth distribution, both in dollar and real terms. Based on my simulation results, the Fair Housing Act had a sizable and heterogeneous effect on the Black wealth distribution. Wealth holding in the top 25% of the Black wealth distribution increased by 1.5–4%, while in the 6th decile, wealth holding decreased by almost 1%. These results suggest that the positive effect of the FHA concentrated on the upper end of the Black wealth distribution, while the FHA could have had a negative effect on the wealth holding of families in the middle of the Black wealth distribution. As a result, the GINI index among Black agents increases from 68.2% to 68.4% in the model, and thus the FHA increased wealth inequality among Black families.

Meanwhile, the Fair Housing Act increases wealth holding in the bottom and middle part of the White wealth distribution. The top panel of Figure 9 shows that even if the change in White wealth holding does not exceed \$200 in any wealth percentiles, wealth holding increases by 2–6% around the 15-40th percentiles of the White wealth distribution. One source of this change is the increasing White homeownership in Black neighborhoods at relatively early ages (Figure 8), as some White agents switched from being renters in the White to being homeowners in the Black neighborhood. Also, as Figure 8 shows, this switch allowed a small fraction of White agents to own a home in the White instead of

Figure 9: Effect of free movement on wealth percentiles



Source: Own simulation. Lines are moving averages (MA5) of the change of simulated wealth percentiles, defined as $p' - p$, where p' is a given wealth percentile without the relocation barrier, and p is the same wealth percentile with the barrier. Missing data points at the bottom were caused by division by zero wealth.

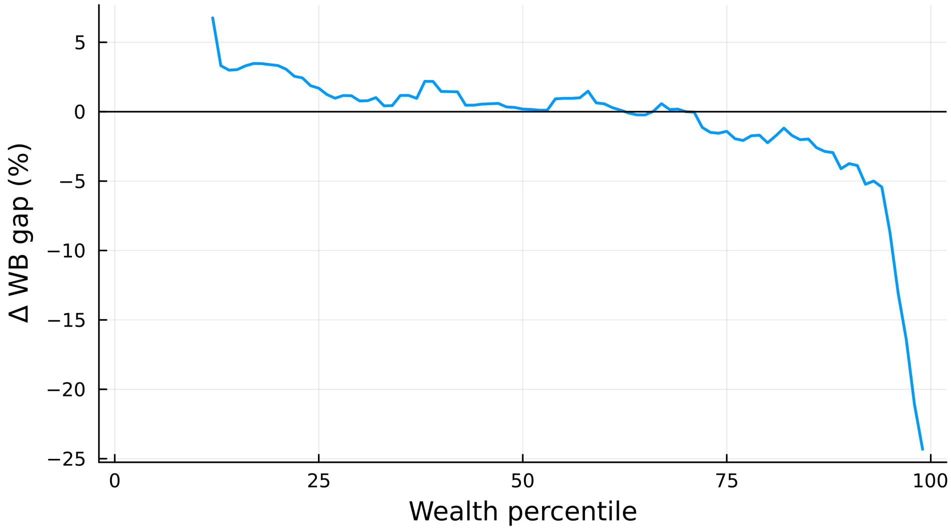
the Mixed neighborhood at later ages. So, even if many White agents were not affected by the FHA in the model, the implied house price changes of the policy alter the optimal homeownership and location choice of White agents on the margin of becoming homeowners. As these agents are concentrated in the middle part of the White wealth distribution, the Fair Housing Act's positive effects concentrated between the 20-60th percentiles of the White wealth distribution. As the top of the White wealth distribution remained unaffected, wealth inequality declined slightly among White families (Table 5).

We can quantify the Fair Housing Act's effect on racial wealth inequality by comparing how the nominal differences between the Black and White wealth distribution changed at each wealth percentile:

$$\Delta\, WB\ gap_p = \frac{WB\ gap_{p,post}}{WB\ gap_{p,pre}} = \frac{W_{p,post}\ -\ B_{p,post}}{W_{p,pre}\ -\ B_{p,pre}}$$

where W_p and B_p are the wealth holding of the White and Black wealth distribution at percentile p, WB_p is the nominal difference between the White and Black wealth distribution at percentile p, while *pre* and *post* reflect the equilibrium before and after the introduction of the FHA in the model. Increasing $\Delta\, WB\, gap_p$ means that the Fair Housing Act increased nominal wealth differences between White and Black households at percentiles p. As Figure 10 depicts, the Fair Housing Act decreased racial wealth inequality at the top quarter of the

Figure 10: Effect of free movement on White/Black wealth gap at different percentiles



Source: Own simulation. Lines are moving averages (MA5) of the percent change of simulated White/Black wealth gap at different percentiles; see text for further clarification of calculation. Missing data points at the bottom were caused by division by zero wealth.

wealth distribution, especially in the very top percentiles, where the decrease reached double digits. As the FHA did not affect the top of the White wealth distribution in the simulation, the large reduction of racial wealth inequality at the top is the result of relocating Black families accumulating more net housing wealth than before. Meanwhile, the Fair Housing Act slightly increased racial wealth inequality between the 2nd and 7th wealth deciles, where $\Delta\, WB\ gap_p$ increased by 1–2%, on average.

As Figure 9 shows, the FHA decreased wealth holding in only a small part of the Black wealth distribution; for the majority of the households, the policy change was wealth neutral or increased their wealth. In this sense, the FHA increased the wealth and the utility of almost all agents in the model. However, my simulations reveal that the gains of the FHA were quite unequal, and most of them concentrated at the top of the Black and at the middle of the White wealth distribution. As a result, the FHA increased wealth inequality among Black and decreased it among White families. Due to the policy change, wealthy Black families were able to get closer to wealthy White families' wealth holding, but the FHA also increased the wealth difference between Black and White households in the majority of the wealth distribution. Put another way, even if the vast majority of Black agents experienced increasing or unchanged wealth due to the FHA in the model, more than half of Black agents experienced that White agents at the same percentile of their wealth distribution benefited more from the policy change than them.

5.4 Discussion: How are simulation results affected by the amenity structure of the model?

Notice that, as a modeling simplification, both race-independent amenities A_n and race-dependent taste factors $\kappa_{R,n}$ are exogenous and do not change as families relocate in the model.[7] Agents' utility from living in neighborhood n also does not depend on any individual-specific taste parameter; conditionally on race, all agents gain the same utility by living in a given neighborhood. This implies that, conditionally on race, age, and current income, agents with higher expected lifetime income sort into neighborhoods with higher amenities in the model.

The exogenous amenity structure of the model could have two important implications for families' relocation decisions in the simulations. First, the outflow of high-income Black families does not change amenity levels in the Mixed and Black neighborhoods. Compared to endogenous amenity structure, in which the race-dependent amenity A_n is a positive function of neighborhood-level average family income, non-changing amenities likely create less outflow of families from the Mixed and Black neighborhoods. This way, non-changing amenities could partly explain why the change in the share of Black families living in the Black neighborhood (Stylized fact II in Table 7) was less in the simulations (-2.4pp) than in reality (-4.1pp). Because of less relocation, the house price change is likely lower with exogenous amenities as well, and changing amenities would imply a higher house price increase in the White and a higher house price drop in the Mixed and Black neighborhoods.

Theoretically, the effect of exogenous race-independent amenities A_n on the simulated change in housing wealth and racial wealth inequality is not clear, but is likely modest. On the one hand, in the case of endogenous amenities, decreasing amenities in the Black and Mixed neighborhoods could *reduce* the homeownership-motivated movement of White and Black families to these neighborhoods. On the other hand, in the case of endogenous amenities, the even greater decrease in house prices in the Mixed and Black neighborhoods could *increase* the homeownership-motivated movement of families from the White neighborhood. Moreover, in the case of endogenous amenities, the homeownership-motivated inflow of higher-income families into the Mixed and Black neighborhoods could also increase average family income and amenities there, which, by itself, could lead to higher house prices

[7] I am currently working on an extension in which I endogenize A_n; as this section shows, endogenizing $\kappa_{R,n}$ does not seem to be necessary.

through more inflow of families. Because of this circularity between the change in amenities and house prices through the homeownership-motivated relocation of families, the new steady-state distribution of housing wealth in the model could be quite similar using either exogenous or average income-dependent endogenous amenities. Because of this, using endogenous A_n amenities would likely not change simulation results on racial wealth inequality substantially.

Second, the other way exogenous amenities could affect simulation results is through race-dependent amenity factor $\kappa_{R,n}$. In the model, the inflow of Black families does not change White families' taste for living in the White neighborhood, which could potentially motivate White families to move. In this case, the model cannot capture the potential tipping of the White neighborhood. However, under reasonable preferences on the racial composition of neighborhoods, tipping is not realistic in the model's White neighborhood. Card et al. (2008) found that, during the 1970s, neighborhoods tipped as White families started to leave if the minority share of neighborhoods, on average, exceeded 9-12% in 1970. Meanwhile, in the initial steady state of the model, only 1.1% of families were Black in the White neighborhood, which increased to 1.9% in the new steady state; based on Card et al. (2008)'s calculations, neither Black share should indicate tipping in the model's White neighborhood.

6 Conclusion

In 1968 the Fair Housing Act (FHA) terminated lawful residential segregation, which was assumed to be one of the major sources of racial wealth inequality. As I presented, in the following decades, more and more Black families moved to integrated neighborhoods, and racial residential segregation declined quickly. Meanwhile, despite Black families were able to accumulate housing wealth at an increased pace during the 1970s, the wealth inequality between Black and White families did not change drastically in the following decades (Derenoncourt et al., 2024). In this paper, I investigate whether, without other changes in the economy, the Fair Housing Act reduced segregation and created a more racially equal society at the same time.

I quantify the direct effect of the FHA on segregation and racial wealth inequality by estimating a quantitative heterogeneous agent life-cycle OLG model. Amongst the first in the literature, I model agents' homeownership and location choices jointly within a dynamic model, which yields new insights into whether the FHA motivated agents to change neighborhoods to become homeowners at different points in their lifetime. In the model, agents' relocation among neighborhoods endogenously changes house prices and, through them, housing wealth, while changing house prices create spillover in the model by motivating other agents to move. I model racial segregation by preventing a fraction of Black families from moving into White neighborhoods, while White agents are free to move into any neighborhood of the model. I estimate this model to match the observed spatial distribution, homeownership, and median wealth holding of Black and White families in 1970.

I simulate the effect of the FHA by lifting restrictions that prevent Black households from residing in the White neighborhood of the model, which motivates 6% of Black agents to move there. The relocation of predominantly high-income Black households increases house prices in the White and decreases house prices in the Mixed and Black neighborhoods, which motivates 0.8% of White agents to leave the White neighborhood of the model. As a result, my simulation results suggest that the FHA reduced the most common measure of segregation, the dissimilarity index between Blacks and non-Blacks, by 6.8 percentage points, which is slightly higher than the observed decline in segregation during the 1970s. Meanwhile, my simulations reveal that the FHA decreased racial differences in average housing wealth, but it has a heterogeneous effect on racial wealth inequality. I find that most wealth gains of the Fair Housing Act concentrate in the upper part of the Black and middle part of the White wealth distribution. As a result, racial wealth inequality substantially decreased in the top 25% but slightly increased in the middle of the wealth distribution.

My results suggest that, in general, the Fair Housing Act did not lead to a lower level of racial wealth inequality; moreover, I find that racial wealth inequality increased in the majority of the wealth distribution due to the Fair Housing Act. As an important policy implication, my work illustrates the importance of taking heterogeneous general-equilibrium effects into account during the design of new policies, which intends to create a more equal society by changing the spatial distribution of families. As my results suggest, as an unintended consequence, most of the positive effects of these policies could easily be concentrated among already wealthy and non-targeted families.

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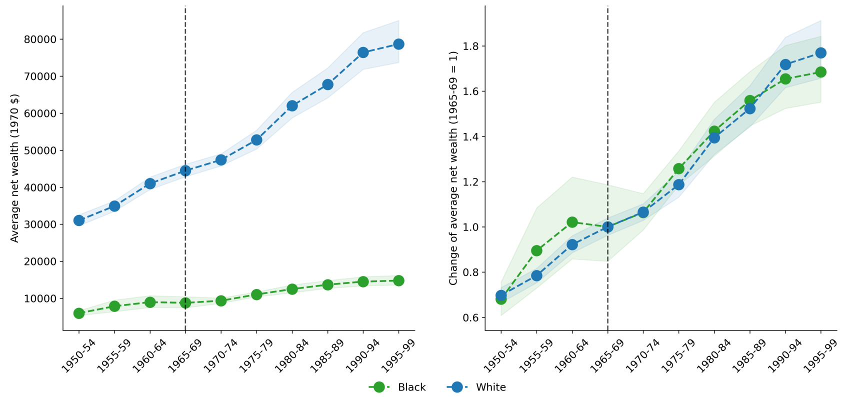
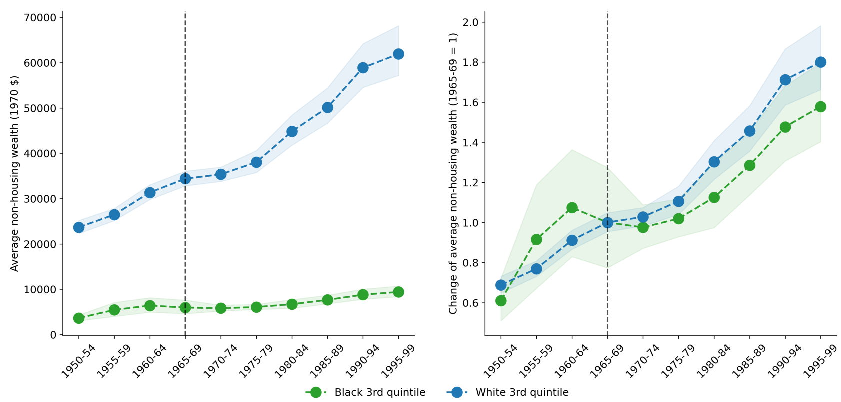
Appendix A: Stylized Facts

Figure A1: Evolution of average net wealth of the Black and White wealth distribution



Source: own calculation, based on SCF+ data. Net wealth is defined as the difference between total asset value minus existing debt. Prices measured in 1970 dollars. Transparent areas represent bootstrapped 95% confidence intervals.

Figure A2: Evolution of average non-housing wealth of the Black and White wealth distribution



Source: own calculation, based on SCF+ data. Non-housing wealth is the difference between total net wealth and housing wealth, which is defined as asset value minus the remaining mortgage of the first residence. Prices measured in 1970 dollars. Transparent areas represent bootstrapped 95% confidence intervals.

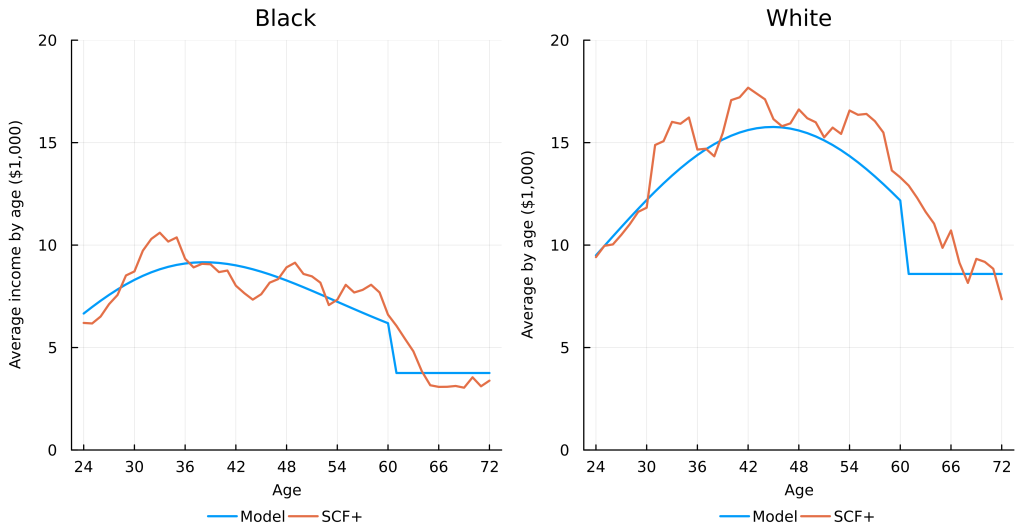
Appendix B: Estimation

Table A1: Calibrated parameters of the income process

	Black income distribution	White income distribution
Life-cycle elements		
Age^0	5.879769	7.155332
Age^1	.1877262	.1076763
Age^2	-.0036298	-.0012546
Age^3	.0000205	8.21e-07
Income fixed effect ρ_R		
Low	-.8481999	-.6473573
Medium	.0899008	.0929006
High	.7667469	.5564716
Temporary income shock parameter with Low ρ_R**:** $\epsilon_{\rho=L,R}$		
Low	-.3672556	-.2847186
Medium	.0019360	.00606490
High	.3653196	.2787603
Temporary income shock parameter with Medium ρ_R**:** $\epsilon_{\rho=M,R}$		
Low	-.2831905	-.2100579
Medium	.0118372	-.0003271
High	.2717945	.2105470
Temporary income shock parameter with High ρ_R**:** $\epsilon_{\rho=H,R}$		
Low	-.2307297	-.2016939
Medium	.0115538	.00829980
High	.2215885	.1935596

Notes: Own calculation based on PSID and SCF+ data. See text for more details.

Figure A3: Fit of calibrated income distribution



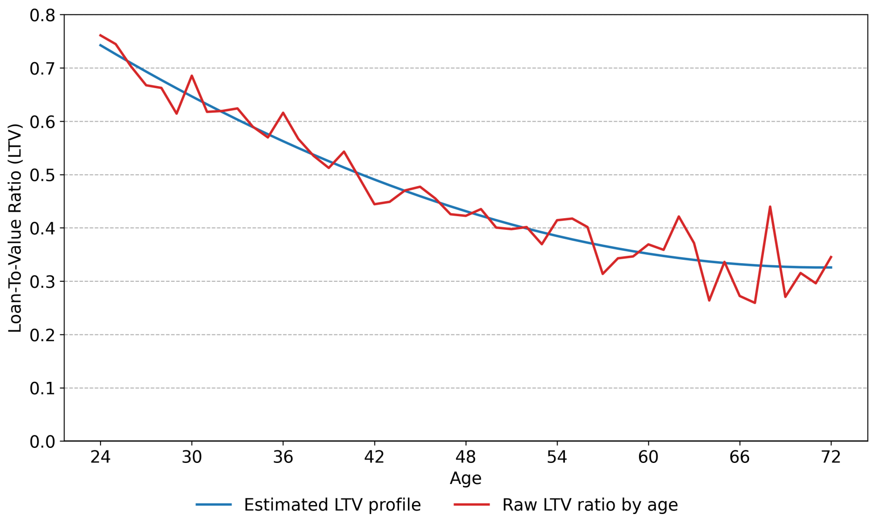
Source: own calculation, based on SCF+ and PSID data. Income is defined as total familiy income. Prices measured in 1970 dollars.

Table A2: Marginal tax rates in 1970 for married couples filling jointly

Over	**But not over**	**Marginal tax rate**	**Over**	**But not over**	**Marginal tax rate**
0	1000	14%	40,000	44,000	48%
1,000	2,000	15%	44,000	52,000	50%
2,000	3,000	16%	52,000	64,000	53%
3,000	4,000	17%	64,000	76,000	55%
4,000	8,000	19%	76,000	88,000	58%
8,000	12,000	22%	88,000	100,000	60%
12,000	16,000	25%	100,000	120,000	62%
16,000	20,000	28%	120,000	140,000	64%
20,000	24,000	32%	140,000	160,000	66%
24,000	28,000	36%	160,000	180,000	68%
28,000	32,000	39%	180,000	200,000	69%
32,000	36,000	42%	200,000		70%
36,000	40,000	45%			

Source: 1970 Instructions for Form 1040, Schedule Y, https://www.irs.gov/pub/irs-prior/i1040--1970.pdf, accessed at 10/24/2024.

Figure A4: Estimated LTV ratio



Source: own calculation, based on SCF+. Estimated cubic function: $LTV = (123.8819 - 2.425384 \times age + 0.0142931 \times age^2 + 0.0000247 \times age^3)/100$.