Neighborhood Segregation and Endogenous Racial Bias *

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Abstract

This paper explores the role of residential segregation in sustaining racial economic disparities in the U.S. We show that income gaps between black and white Americans are more pronounced in regions with higher residential segregation, and that this relationship has strengthened as segregation by income has risen. To understand this finding, we develop a general equilibrium overlapping generations model with residential choice and local spillovers, where white and black agents are identical except that black agents start with an initial income distribution that is first-order stochastically dominated by that of white agents due to historical racial institutions, such as racial covenants. When white agents infer the ability distribution from observed income, they do not take into consideration that agents were exposed to different local spillovers when growing up. Given the initial conditions, this generates an endogenous racial bias that is sustained by residential segregation by income. We calibrate the model to match the joint dynamics of racial and income segregation in U.S. metropolitan areas from 1960 to 2010. A decomposition exercise shows that income-based sorting, homophily, and the endogenous racial bias each contribute to the persistence of racial disparities. We show that a one-time race-targeted transfer can accelerate convergence toward racial equality by breaking the feedback loop between segregation, biased beliefs, and economic inequality.

Keywords: Income inequality, Residential segregation, Racial bias, Local externalities
JEL Classification: E24, I2, O15, R2

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1 Introduction

Racial disparities in economic outcomes have been a persistent feature of the U.S. economy, with significant and long-standing gaps in income, wealth, and educational attainment between black and white Americans. We show that these gaps are particularly pronounced in regions with high levels of residential segregation, suggesting a potential relationship between neighborhood composition and racial discrimination. This paper examines whether residential segregation has contributed to the persistence and amplification of racial economic gaps and explores how racial policies, like racial covenants and red lining, may have persistent effects even after their removal.

We start by documenting a novel linkage between racial disparities and residential segregation by income. In particular, using geo-coded Census data, we show that the earnings gap between white and black Americans is more severe in areas with higher levels of residential segregation, and that this relationship has strengthened over the last few decades as residential segregation by income has increased. Moreover, we show that upward mobility (measured as the probability of moving out of the lowest quartile of the income distribution) is lower in more segregated metros, and that this effect is strikingly asymmetric by race: segregation is associated with lower upward mobility for black men but higher upward mobility for white men. These facts raise the question of whether segregation itself is a driver of racial disparity.

To analyze this issue, we develop a general equilibrium overlapping generations model with both white and black agents, with residential choice and local spillovers, where residential segregation and racial bias emerge endogenously. There are two neighborhoods, A and B, and neighborhood exposure affects children's income. The local spillover depends on the average parental income and on the average ability of the children growing up in the neighborhood. This general formulation allows us to capture several forces behind the local externalities: quality of public schools through local taxation, networks, social norms, peer effects, learning from neighbors' experience, and so forth. Local spillovers can sustain residential segregation by income. If neighborhood A has higher spillover, richer parents will be more willing to pay for the higher rent to give better opportunities to their children. This will feed back in endogenously higher spillover in A, sustaining the segregated equilibrium. If we consider that black agents start with an initial income distribution that is first-order stochastically dominated by that of white agents due to historical racial institutions, such as racial covenants or red lining, then our model can also sustain an equilibrium with residential segregation by race on top of income. Given the initial condition, black agents will be more concentrated in the neighborhood with lower spillover, neighborhood B, hence perpetuating lower

income for their children.

Given that there is a growing empirical literature that documents systematic differences in perceptions of opportunity and discrimination across racial groups,[1] we also introduce the assumption that white agents misperceived the opportunities of black children.

When observing the income distribution of other parents, white agents do not take into account that growing up they were exposed to different local spillovers. This assumption endogenously generates racial bias, and even more residential segregation by race. In particular, given that black agents are initially more concentrated in neighborhood B, when white agents observe lower average income for black agents, they infer that black agents have lower average ability. This is what we refer to as endogenous racial bias. This affects their beliefs about the local spillovers in the two neighborhoods and distorts their residential choice. In particular, white agents are willing to pay higher rents to live in neighborhood A, where there is smaller concentration of black agents, relative to the effective benefit of growing up there. This implies that even in the absence of fundamental differences in ability distributions, the racial bias persist even more than in the benchmark model with rational expectations.

We calibrate the model to match key features of U.S. metropolitan areas from 1960 to 2010, including the dynamics of residential segregation by race and by income. In particular, we assume that in 1960 the economy starts from the steady state of an equilibrium where black agents need to pay a tax to live in neighborhood A to resemble racial policies, such as covenant policy. If we choose a racial tax to match racial segregation, the model is able to generate a wage gap that is roughly one third of the one observed in the data in 1960, as there are other forces that are omitted in our analysis. Then we assume that at the end of 1960, this tax is eliminated and show that the wage gap persists even if there is no fundamental difference between black and white agents. Through a series of quantitative exercises, we show that neighborhood externalities, homophily, and the endogenous racial bias account for a significant portion of the persistence in wage gaps documented in the data. Comparative statics reveal that the interaction between neighborhood spillovers and homophily is critical: when spillovers are weak, homophily alone can trap the economy in a persistently segregated equilibrium, while stronger spillovers eventually provide sufficient economic incentive to overcome same-race preferences and drive integration. A decomposition exercise isolates the contribution of each channel, showing that income-based sorting generates transient

[1] Survey evidence shows that white Americans are significantly less likely than Black Americans to view discrimination and structural barriers as important determinants of economic outcomes (e.g., Pew Research Center, 2016; Mijs, 2021; Alesina, Ferroni, and Stantcheva, 2024).

persistence, homophily amplifies and prolongs it, and the racial bias further slows convergence. Finally, we show that a one-time race-targeted transfer can accelerate convergence toward racial equality by enabling black agents to access better neighborhoods sooner, triggering a virtuous cycle of higher income, reduced segregation, and eroding racial bias.

Related Literature. Our paper builds on the theoretical literature on neighborhood effects and intergenerational mobility, originating with Schelling (1969, 1971), Becker and Tomes (1979), and Loury (1981), and extended to the spatial dimension by Durlauf (1996b,a), Benabou (1996a,b), and Fernandez and Rogerson (1996, 1998).

A large empirical literature documents the importance of neighborhood exposure for intergenerational outcomes (Chetty et al., 2014; Chetty and Hendren, 2018a,b; Chetty et al., 2016). These findings have motivated quantitative models of neighborhood externalities: Durlauf and Seshadri (2017) show that neighborhood-level human capital externalities can replicate the "Great Gatsby Curve," Fogli et al. (forthcoming) develop a general equilibrium OLG model with residential choice and endogenous local spillovers to quantify the role of segregation in amplifying the effects of the rise in the skill premium. Recent work has used these quantitative frameworks for policy evaluation, including Chyn and Daruich (forthcoming), Eckert and Kleineberg (2024), and Fogli et al. (2026).

A closely related strand of the literature examines the interaction between racial disparities and residential segregation. On the historical and institutional origins, Cutler and Glaeser (1997) show that blacks in more segregated areas have significantly worse outcomes, Cutler et al. (1999) document the rise and decline of the American ghetto, and Aaronson et al. (2021) and Althoff and Reichardt (2024) show the lasting effects of HOLC redlining and Jim Crow laws. Massey et al. (2009), Sethi and Somanathan (2009), and Intrator et al. (2016) document the shifting bases of segregation, showing that income has increasingly supplanted race as the primary dimension of residential sorting. On racial gaps, Bayer and Charles (2018) document that the convergence in black–white earnings stalled after 1980, Derenoncourt et al. (2024) trace the racial wealth gap from 1860 to 2020, and Mazumder (2021), Davis and Mazumder (2017), Chetty et al. (2020), Durlauf et al. (2024), and Chetty et al. (forthcoming) document persistent racial gaps in intergenerational mobility. Alesina et al. (2021) document widespread misperceptions about the sources of these gaps, finding that Americans overattribute disparities to individual characteristics.

A related body of work studies the spatial mechanisms underlying racial sorting. Bayer et al. (2004), Bayer and McMillan (2005), and Caetano and Maheshri (2025) develop equilibrium models of racial

sorting, while Card et al. (2008) and Banzhaf and Walsh (2013) study tipping dynamics. Bayer et al. (2021), Bayer et al. (2014), Bayer et al. (2017), and Christensen and Timmins (2023) show that black and white households with similar incomes live in markedly different neighborhoods and face different housing prices, while Aliprantis et al. (2024) attribute this residual segregation to racial homophily and the limited supply of high-status black neighborhoods. Bayer et al. (2025) and Davis et al. (2024) provide further evidence that racial sorting remains a persistent force. Causal evidence on changes in residential composition comes from Derenoncourt (2022) on the Great Migration, Chyn et al. (2025) on the Gautreaux desegregation program, Billings et al. (2014) on the end of busing in Charlotte-Mecklenburg, and Almagro et al. (2023) on public housing demolitions in Chicago.

On the theory side, Aliprantis and Carroll (2018) develop a two-neighborhood model calibrated to 1960s Chicago to study the effects of removing legal racial discrimination, and Gregory et al. (2024) analyze how racial segregation shapes the black–white college attainment gap. Manysheva et al. (2025) provide complementary evidence from post-Apartheid South Africa. More broadly, Hsieh et al. (2019) quantify the macroeconomic costs of barriers to the allocation of talent by race and gender, Hurst et al. (2024) document the role of task-based discrimination in sustaining racial wage gaps, and Boerma and Karabarbounis (2023) study how reparation transfers interact with persistent racial wealth gaps. Closest to our work, Bellue (2025) develops a spatial equilibrium model in which segregation distorts parental beliefs about the returns to neighborhood quality through social learning. Our paper proposes a distinct but complementary mechanism in which racial bias arises endogenously: agents misattribute income gaps caused by differential neighborhood exposure to differences in ability, generating a self-reinforcing feedback loop between segregation and discrimination.

Finally, our work connects to the broader urban economics literature on spatial sorting and neighborhood formation, including Guerrieri et al. (2013) on endogenous amenities and gentrification, Couture et al. (2023) on within-city re-sorting, and Bilal and Rossi-Hansberg (2021) on residential choices as asset investment.

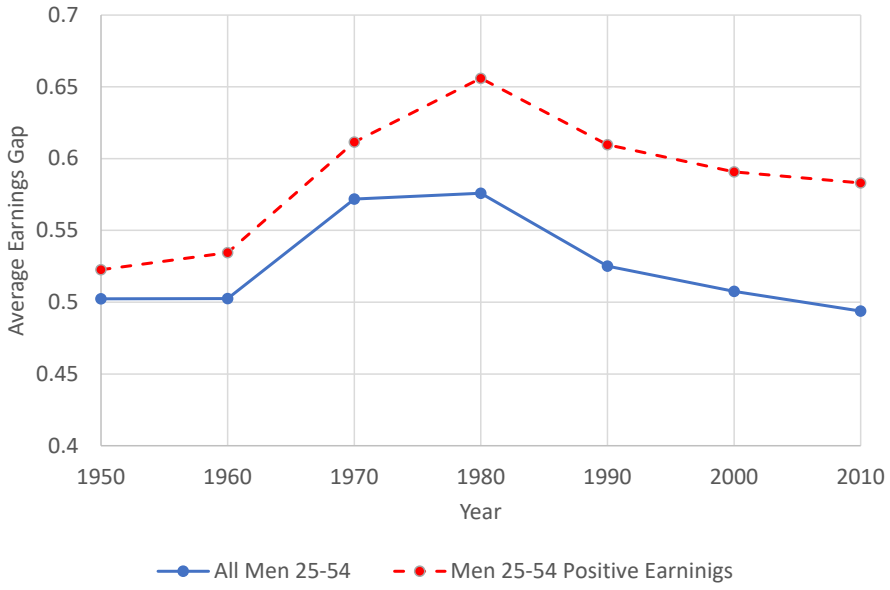
2 Empirical Evidence

In this section, we document the recent increase in the earnings gap between black and white men and its connection to residential segregation. We use decennial Census data and focus on men aged 25–54.

Figure 1 plots the ratio of average black to average white earnings from 1950 to 2010, both for all men and

restricting the sample to those with positive earnings. Two facts emerge. First, black men made progress in relative earnings during the first part of the sample period (the ratio for men with positive earnings rose from about 0.52 in 1950 to 0.65 in 1980), but after 1980, this convergence reversed. Second, the gap is larger and widens faster when all men are included, reflecting the substantially higher rate of labor force nonparticipation among black men. For this group, the black-white earnings ratio in 2010 (0.49) falls below its 1950 level (0.50), implying that the overall racial earnings gap is now wider than it was six decades earlier.

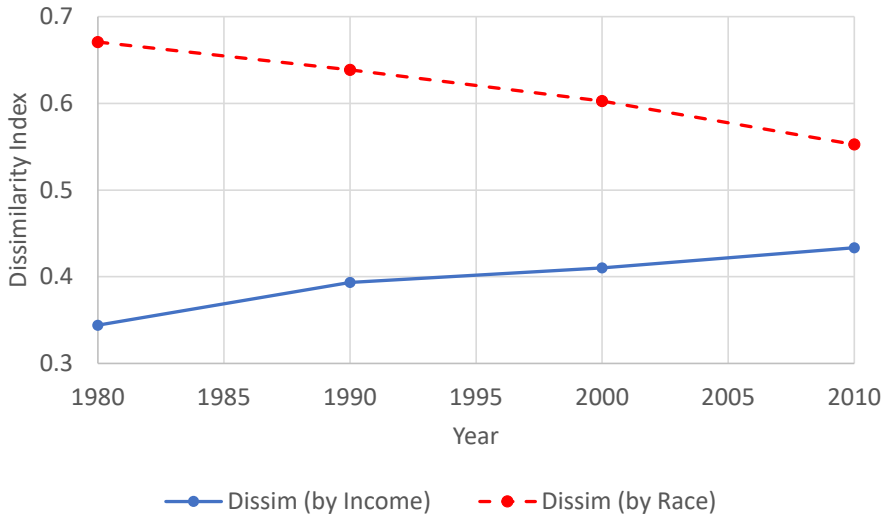
Figure 1: Black White Earnings Gap



Over the same period, the two dimensions of residential segregation moved in opposite directions. Figure 2 displays the population-weighted dissimilarity index across U.S. metropolitan areas, using census tracts as the geographic subunit. Segregation by race (dashed red line) declined steadily, falling from 0.67 in 1980 to 0.55 in 2010, while segregation by income (solid blue line) rose from 0.34 to 0.43 over the same period.

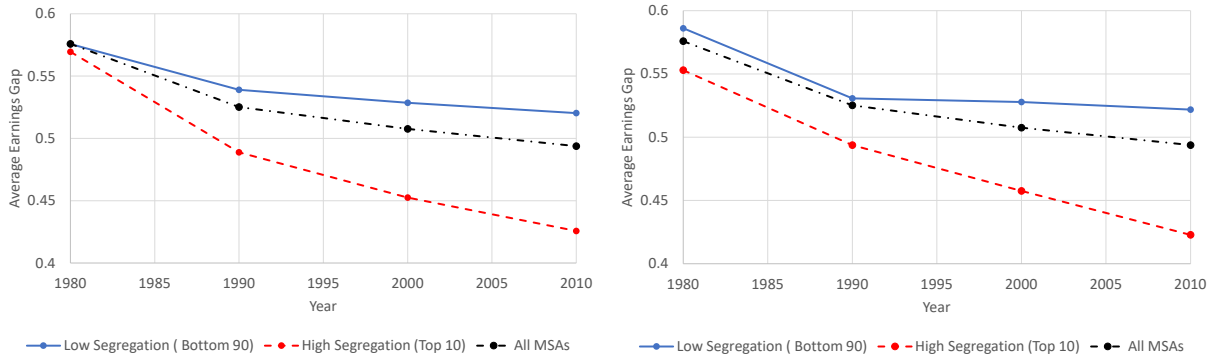
The coincidence of rising income segregation with the reversal in black-white earnings convergence raises the question of whether segregation itself is a driver of racial disparities. We investigate this by examining the relationship between the racial earnings gap and residential segregation across metros. Panel (a) of Figure 3 splits the sample into the ten most and least racially segregated metros. In 1980, the black-white earnings ratio is nearly identical across the two groups (approximately 0.57). By 2010, however, the ratio

Figure 2: Race and Income Segregation



in highly segregated metros has fallen to about 0.43, while in less segregated metros it remains at 0.52, a gap of nearly 10 percentage points. Panel (b) presents the same split using income segregation and reveals a similar pattern: the widening of the racial earnings gap over the last three decades is driven disproportionately by metros with high residential segregation.

Figure 3: Earnings Gap by Segregation



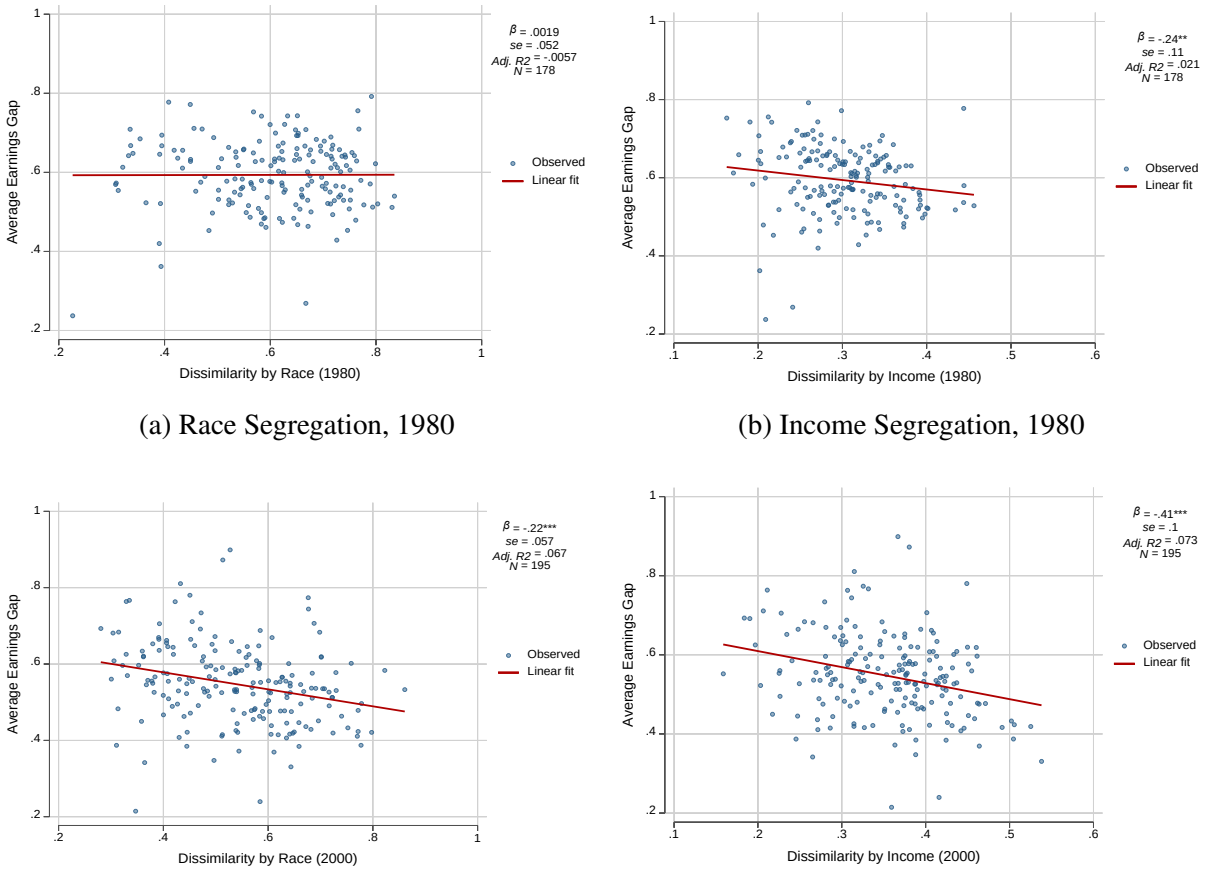
(a) By Race Segregation

(b) By Income Segregation

Figure 4 presents metro-level scatter plots of the black-white earnings ratio against the dissimilarity index, by race (left column) and by income (right column), in 1980 (top row) and 2000 (bottom row). In 1980, there is essentially no cross-sectional relationship between segregation and the earnings gap (Panels (a) and (b): $\hat{\beta} \approx 0$). By 2000, a strong negative relationship has emerged: more segregated metros have

significantly lower black-white earnings ratios (Panel (c): $\hat{\beta} = -0.22$, $p < 0.01$, $N = 195$). This pattern suggests that the link between segregation and racial earnings disparities developed over time, precisely as income segregation was rising.

Figure 4: Earnings Gap and Segregation



(a) Race Segregation, 1980

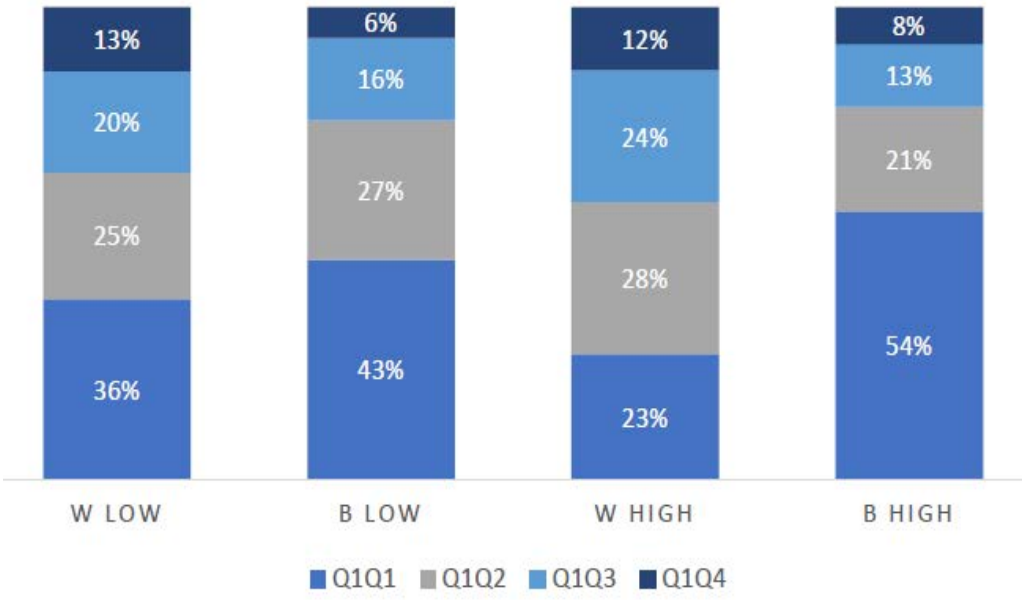
(b) Income Segregation, 1980

(c) Race Segregation, 2000

(d) Income Segregation, 2000

Finally, residential segregation is associated not only with larger earnings gaps but also with lower intergenerational mobility, and the effects are strikingly asymmetric by race. Figure 5 displays the transition probabilities for men born in the bottom quartile of the income distribution, split by race and metro-level segregation. In less segregated metros, 43% of black men remain in the bottom quartile, compared to 36% of white men. In highly segregated metros, persistence rises sharply for black men, to 54%, while it actually *falls* for white men, to 23%. Thus, segregation appears to improve upward mobility for white men while substantially reducing it for black men, consistent with a mechanism in which segregation concentrates neighborhood disadvantage among black families.

Figure 5: Upward Mobility by Race



Taken together, these facts point to a tight connection between residential segregation, particularly by income, and the persistence of racial economic disparities. The evidence is consistent with a mechanism in which income-based residential sorting exposes black families to worse neighborhood spillovers, depressing their children's outcomes and sustaining the racial earnings gap even as explicit racial barriers have declined. In the next section, we develop a model that formalizes this mechanism. Residential segregation by income generates differential exposure to local spillovers, and a behavioral assumption about how agents form beliefs about ability gives rise to an endogenous racial bias that reinforces the segregation. The model can account for the joint dynamics of declining racial segregation, rising income segregation, and persistent racial earnings gaps documented above.

3 Model

The economy is populated by overlapping generations of agents who live for two periods. In the first period, the agent is a child, and in the second period, she is a parent. At each time t there is a continuum of measure 1 of parents, of which a fraction μ is black. A parent is characterized by a triplet $\{y, a, \chi\}$, where $y \in [\underline{y}, \overline{y}]$ denotes the parental income, $a \in [\underline{a}, \overline{a}]$ the ability of the child, and $\chi \in \{w, b\}$ the parent's race,

where $\chi = w$ if the agent is white and $\chi = b$ if she is black.

Let us define $F_t(y,a|\chi)$ the joint distribution of parental income and children ability conditional on parental race χ.

We assume that ability is iid with respect to race, so that the marginal distribution for ability is identical for white and black parents and is the same at each time t, that is,

$$F_{a,t}(a|w) = F_{a,t}(a|b) = G(a),$$

for all $t \geq 0$, where $F_{a,t}(a|\chi)$ denotes the marginal distribution with respect to a at time t, conditional on race χ. Ability is perfectly transmitted across generation, that is, the ability of a child is the same as her parent's ability.[2] A parent knows her child's ability, but cannot observe the ability of the other children.

We also assume that the initial marginal distribution of income for black parents is first-order stochastically dominated by the marginal distribution of income for white parents, that is,

$$F_{y,0}(y|w) \leq F_{y,0}(y|b),$$

with strict inequality at some y. However, the marginal distribution with respect to income conditional on race, $F_{y,t}(y|\chi)$, evolves endogenously over time, as children's income is affected by the parental residential choice, as we explain below. In the quantitative section, this initial difference in income distributions will be the result of racial covenant policies.

There are two neighborhoods, A and B, and the parents live in houses of the same dimension and quality. Let R_{At} and R_{Bt} denote the rents at time t in the two neighborhoods. For simplicity let us assume that neighborhood A has a fixed housing supply H, and that neighborhood B features perfectly elastic housing supply.[3] Moreover, let us normalize the marginal cost of housing construction in neighborhood B to zero. This implies that $R_{Bt} = 0$ for all t, and the only endogenous price is the rent in neighborhood A, R_{At}.

At each time t parents choose their consumption $c_t(y,a,\chi)$ and the neighborhood where to raise their children $n_t(y,a,\chi)$. Parents care both about their own consumption and about their children's future in-

[2] In the quantitative version of the model we will make $\log(a)$ follow an AR(1) process.

[3] We can easily generalize the model to a more standard housing supply in neighborhood $k \in \{A,B\}$, equal to

$$H_{kt} = \lambda_k R_{kt}^{\phi_k},$$

where ϕ_k represents the housing elasticity in neighborhood k and λ_k a positive scalar. The important assumption for the qualitative results is that there is at least one neighborhood with not fully elastic housing supply.

come.[4] In particular, their preferences are given by $u(c_t(y,a,\chi)+g(y_{t+1}(y,a,\chi))$, where u is a concave and continuously differentiable utility function, and g is increasing and continuously differentiable, and $y_{t+1}(y,a,\chi)$ is their child's income. From now on, for simplicity, we are going to drop the dependence of consumption, neighborhood choice and future income from the triplet (y,a,χ).

The key difference between the two neighborhoods is given by the presence of local spillovers that affect the future income of children growing up there. We denote the size of the local spillover in neighborhood n at time t by S_{nt}. Together with the local spillover, children's income is affected by their ability and parental income according to

$$y_{t+1} = a^{\alpha} y^{\beta} S_{n_t t}^{\gamma} \varepsilon, \tag{1}$$

where ε is a iid normally distributed noise with cdf Ψ. Children with higher ability and who grow up in neighborhoods with larger spillover will have higher future income.

Let us now turn to the spillover. We assume that the size of the spillover effect in neighborhood k at time t is equal to a weighted average of the average parental income in the neighborhood and of the average ability of the children growing up there, that is,

$$S_{kt} = \omega E_t[y|n_t = k] + (1-\omega)E_t[a|n_t = k], \tag{2}$$

where ω is the weight assigned to the average parental income, so that if $\omega = 1$ the spillover depends only on average parental income, while if $\omega = 0$ the spillover depends purely on average children ability. The general formulation with $\omega \in (0,1)$ allows us to capture different forces behind neighborhood externalities: some more related to the average parental income, such as the quality of public schools through local taxation, networks, or social norms, and some more related to the average talent of the children growing up in the neighborood, such as peer effects or learning from neighbors' experience. The presence of this externalities implies that the rental rate in neighborhood A, R_{At}, also depends on the relative size of the spillovers in the two neighborhoods, which is endogenous.

Agents can observe the marginal distribution of income conditional on race $F_{y,t}(y|\chi)$ for $\chi \in \{w,b\}$, but cannot observe the marginal distribution of ability, $F_{a,t}(a|\chi)$. In particular, they know that it is lognormal, but they do not know the mean and form beliefs about it by observing the parental income distribution.

[4] This assumption is common in this class of models. The assumption that agents cannot save (if not by investing in housing or kids'education) is for simplicity. The assumption that agents cannot borrow is for realism, given that typically people cannot borrow against children's future income. An alternative specification could have parents getting utility directly from their children's consumption, with the introduction of a more general borrowing constraint.

In a baseline version of the model, where agents are rational, they know the income equation (1) and the spillover equation (2), so that they can perfectly infer the local spillovers and understand that the ability marginal distribution is independent of race.

Inspired by a large empirical literature that documents systematic differences in perceptions of opportunity and discrimination across racial groups,[5] we assume that white agents misperceived the opportunities of black children. In particular, when looking at the income distribution of other parents, white agents do not take into account that growing up they were exposed to different local spillovers. Instead they think that all other parents were exposed to the same city-wide average spillover $\bar{S}_{t-1}$, that is they think that the income equation is

$$y_t = a_{t-1}^{\alpha} y_{t-1}^{\beta} \bar{S}_{t-1}^{\gamma} \varepsilon_t. \tag{3}$$

This implies that when they observe a different parental income distribution for white and black agents, they attribute part of this difference to a different underlying ability distributions. That is, when they observe parental income by race χ, they do the following regression:

$$E_t[\log(y_t)|\chi] = \alpha E_t[\log(a_{t-1})|\chi] + \beta E_t[\log(y_{t-1})|\chi] + \gamma log(\bar{S}_t) + log(\varepsilon_t), \tag{4}$$

for $\chi = \{w, b\}$. Given the initial conditions, black agents are more concentrated in neighborhood B. However, given that white agents mistakenly assume that all neighborhoods have the same spillover, they attribute part of the difference in average income between black and white agents to differences in average ability. Let us define "racial bias" the perceived average ability gap between white and black parents, that is,

$$\delta_t \equiv E_t[\log(a_{t-1})|\chi = b] - E_t[\log(a_{t-1})|\chi = w]).$$

By using condition (4) for $\chi = w$ and $\chi = b$, we find the endogenous equilibrium racial bias as follows

$$\delta_t = \frac{1}{\alpha}\left[E_t[\log(y_t)|\chi = b] - E_t[\log(y_t)|\chi = w] - \beta\left(E_t[\log(y_{t-1})|\chi = b] - E_t[\log(y_{t-1})|\chi = w]\right)\right].$$

We assume that black agents do not have this misperception and recognize that the correct income process is given by equation (1). They can then infer that the ability distribution is identical for white and black agents.[6]

[5] Survey evidence shows that white Americans are significantly less likely than Black Americans to view discrimination and structural barriers as important determinants of economic outcomes (e.g., Pew Research Center, 2016; Mijs, 2021; Alesina, Ferroni, and Stantcheva, 2024).

[6] We can generalize the model to accomodate different fractions of white and black agents with misperception. The main qualitative results go through as long as there is a larger fraction of white agents who suffer by the misperception.

While white parents do not recognized that other parents' income was affected by local spillovers, they know that their children income follows the correct law of motion (1) and is indeed affected by the neighborhood where they grow up. However, in making their residential choice, they use beliefs about the local spillovers that are distorted by their racial bias as long as $\omega < 1$, in which case local spillovers depend on the ability distribution of the children growing up there. This is not the case for black agents, who can infer what the correct local spillovers are. In particular, $\tilde{S}_{k\chi t}$ denotes the belief of an agent of race χ about the spillover in neighborhood k at time t and is given by

$$\tilde{S}_{k\chi t} = \omega E_t[y|n_t = k] + (1-\omega)E_t^{\chi}[a|n_t = k], \tag{5}$$

where E_t^{χ} means that the average is taken using the beliefs of agent of race χ about the marginal distributions $F_{a,t}(a|\chi)$, which is equal to the effective one $G(a)$ for $\chi = b$, but is equal to the same distribution shifted by $-\delta_t$ for $\chi = w$. This implies that $\tilde{S}_{kbt} = S_{kt}$, while $\tilde{S}_{kwt}$ is generically different from the effective $S_k t$.

To summarize, the optimal problem of parent (y,a,χ) at time t can be written as

$$U(y,a,\chi) = \max_{c_t, n_t, \tilde{y}_{t+1}} u(c_t) + E_{\chi}[g(\tilde{y}_{t+1})] \tag{P1}$$

$$s.t.\ \ c_t + R_{n_t t} \leq y \tag{6}$$

$$\tilde{y}_{t+1} = a^{\alpha} y^{\beta} \tilde{S}^{\gamma}_{n_t \chi t} \varepsilon, \tag{7}$$

taking as given R_{kt} and $\tilde{S}_{k\chi t}$ for $k \in \{A,B\}$ and $\chi \in \{w,b\}$, where $\tilde{y}_{t+1}$ is the expected children income.

We are now ready to define an equilibrium. In particular, we focus on equilibria where $R_{At} > R_{Bt}$, that is, equilibria where the spillover in A is higher than the spillover in B.

Definition 1 *For given initial distributions $F_0(y,a|b)$ and $F_0(y,a|w)$, an equilibrium is characterized by a sequence of consumption and residential choices, $\{c_t(y,a,\chi)\}_t$ and $\{n_t(y,a,\chi)\}_t$, a sequence of rents, spillover sizes, and spillover beliefs in neighborhoods A and B, $\{R_{nt}\}_t$, $\{S_{nt}\}_t$, $\{\tilde{S}_{n\chi t}\}_t$ for $n = A,B$ and $\chi = b,w$, and a sequence of distributions $\{F_t(y,a|b)\}_t$ and $\{F_t(y,a|w)\}_t$ that satisfy the following conditions:*

1. *agents' optimization: for each t, the policy functions c_t and n_t solve problem (P1), for given R_{nt} and $\tilde{S}_{n\chi t}$ for $n = A,B$;*
2. *spillovers' consistency: for each t, equation (2) is satisfied for both $n = A,B$;*
3. *spillovers' beliefs: for each t, equation (5) is satisfied for both $n = A,B$, and $\chi = b,w$;*

4. *market clearing: for each t, $R_{Bt} = 0$, and R_{At} ensures housing market clearing in neighborhood A:*

$$H = \mu \int \int_{n_t(y,a,\chi)=A} dF_t(y,a|b)dyda + (1-\mu) \int \int_{n_t(y,a,\chi)=A} dF_t(y,a|w)dyda;$$

5. *income dynamics: for each t and each triplet (y,a,χ):*

$$y_{t+1}(y,a,\chi) = a^{\alpha} y^{\beta} S^{\gamma}_{n_t(y,a,\chi)t} \varepsilon,$$

where ε is an iid normally distributed noise with cdf Ψ.

The key parental choice that shapes the equilibrium allocation is the residential choice that depends on beliefs about the local spillovers. The interesting feature of the equilibrium is that white agents have distorted beliefs about the local spillovers that tend to make them more willing to pay higher rents to live in neighborhoods with lower concentration of black agents.

It is easy to show that the optimal residential policy can be characterized by a race-specific cut-off function

$$n_t(y,a,\chi) = \begin{cases} B \text{ if } y < \hat{y}_{\chi t} \\ A \text{ if } y \geq \hat{y}_{\chi t} \end{cases}. \tag{8}$$

where the cut-off is given by

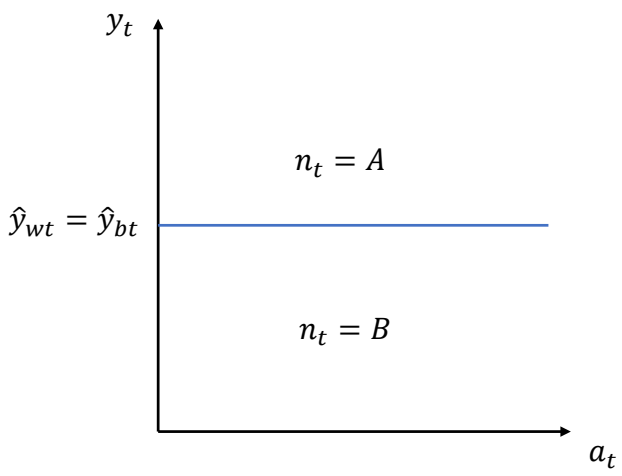
$$\hat{y}_{\chi t} = R_{At} \frac{b + \tilde{S}^{\gamma}_{A\chi t}}{\tilde{S}^{\gamma}_{A\chi t} - \tilde{S}^{\gamma}_{B\chi t}}. \tag{9}$$

As one would expect, the cut-off is increasing in the rent of neighborhood A, which is the relative cost of living in A. Also it is decreasing in the belief of the spillover in neighborhood A and increasing in the belief of the spillover in neighborhood B, that affect the perceived benefit of living in A. The policy function shows that only agents who are rich enough are willing to pay for the higher rent in order to benefit from the higher local spillover.

Let us first consider a benchmark case where no agent has misperception and all agents know the effective size of the spillover in the two neighborhoods. In this case, the residential cut-off is the same for white and black agents and $\tilde{S}_{kwt} = \tilde{S}_{kbt} = S_{kt}$ for all k and t. Figure 6 shows the optimal residential choice for this benchmark.

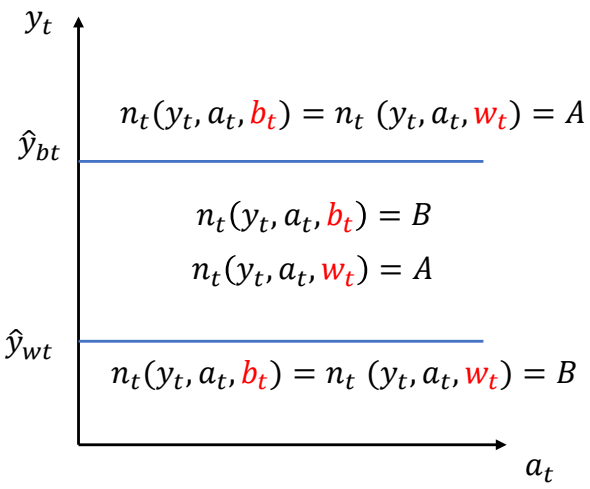
However, in our model, while the black agents still know the effective spillovers, that is, $\tilde{S}_{kbt} = S_{kt}$ for all k and t, the white agents have beliefs about the spillovers in the two neighborhoods that are distorted by their racial bias. This implies that they tend to underestimate the spillover in a neighborhood with a higher concentration of black agents. Given our initial condition on the income distribution, we start from a

Figure 6: Residential Choice in the Benchmark Model



situation where more black agents are poor and so are more concentrated in neighborhood B. This implies that white agents will underestimate the spillover in neighborhood B and will be willing to pay a higher rent to live in neighborhood A, perpetuating the racial bias. Figure 7 illustrates the residential choice in the model with racial bias.

Figure 7: Residential Choice in the Model with Racial Bias



In the next section, we calibrate a more general version of the model to explore how wage gaps persisted

after racial covenant policies have been removed.

4 Quantitative Exercise

In this section, we use a calibrated version of the model to study how the average U.S. metropolitan area responds to the removal of racial covenant policies around 1960. We assume the economy is initially in a steady state with binding racial covenants and analyze the effects of an unexpected, one-time, permanent elimination of the neighborhood wedge. Our calibration strategy targets, on the one hand, key features of the average metro area in 1960, and on the other hand, the subsequent transition dynamics of racial and income segregation observed in the data. Through a series of quantitative exercises, we show that the model can account for a significant portion of the persistence in wage gaps documented in the data.

4.1 Quantitative Model

We now extend the model to make it suitable for quantitative analysis.

First, we introduce race-specific neighborhood preferences to capture the role of homophily in neighborhood choice. In particular, we assume that agents like to live in neighborhoods with a higher share of individuals fo their same race. In particular, we assume that the utility of agents of race χ living in neighborhood n at time t has an additional additive term $\kappa \log(K_{n\chi t-1})$, where κ is a parameter that captures the role of homophily and $K_{n\chi t-1}$ is the share of agents of race χ living in neighborhood n at time $t-1$.[7] The homophily term introduces a force for racial residential segregation separate from the racial bias. In the next section, we conduct counterfactuals to quantify the separate roles of homophily and racial bias in generating persistent difference in outcomes by race.

Second, we introduce an idiosyncratic neighborhood preference shock, ζ_n, drawn from a type I extreme value distribution with scale parameter σ_ζ. This shock introduces idiosyncratic reasons for agents to choose a neighborhood, creating variation in neighborhood choice conditional on income and race.

As a result, agents preferences now take the following form:

$$u(c_t) + E_\chi[g(\tilde{y}_{t+1})] + \kappa \log(K_{n\chi t-1}) + \sigma_\zeta \zeta_n.$$

Finally, for the quantitative analysis, we generalize the ability process to follow a stationary AR(1) in logs:

$$\log a_t = (1-\rho)\mu_a + \rho \log a_{t-1} + \sigma_a \nu_t,$$

[7] We use the past period racial distribution for simplicity.

where ν_t is i.i.d. standard normal, and μ_a, ρ, and σ_a govern the mean, persistence, and volatility of the ability process, respectively.

4.2 Calibration

We now describe our calibration strategy. We assume that in 1960 the economy is in steady state with a racial neighborhood wedge τ in place, indicating that black agents pay more than white agents to live in neighborhood A. At the end of the period, the wedge is unexpectedly lifted and set permanently to 0, to capture the removal of the legal institutions that contributed to racial residential segregation. In the model, we interpret one period as 10 year and set the period $t = 0$ to 1960, when the economy is in steady state.

As described in Section 3, white agents are "behavioral" in the sense that, when they infer the ability distributions for white and black agents from wages, they do not consider that wages are affected by the local spillovers, but assume that they are affected by the average citywide spillover. Given that black agents start in a steady state with lower average wages, the white agents incorrectly deduce that black agents have lower average ability, generating an endogenous racial bias.

We choose parameters to match salient features of the U.S. economy from 1960 to 2010. In particular, we set four parameters externally and calibrate eleven parameters to match sixteen data moments. Table 1 reports our calibration targets and their sources, and Table 2 reports the full set of parameters.

Mapping neighborhoods to data. To bring the model to the data, we need to map the two neighborhoods in the model to geographic units observed in the Census. For each metropolitan statistical area (MSA), we rank census tracts by the share of rich families residing there, where we define as "rich" the families in the top 20th percentile of the income distribution of that MSA. We then choose a cutoff such that neighborhood A comprises the census tracts covering approximately two-thirds of the MSA population, and the remaining one-third is assigned to neighborhood B. Once we have grouped census tracts into two neighborhoods for each MSA, we calculate the relevant statistics, such as dissimilarity indices, income distributions, and housing costs, for all MSAs and average them weighting by population.

Externally set parameters. Panel A of Table 2 reports the parameters that are externally calibrated to match the corresponding data moment. The share of black agents in the population is set to $\mu = 0.15$, consistent with the share of African Americans in the U.S. around 1960.[8] We also assume perfectly inelastic housing supply in neighborhood A ($\phi_A = 0$) equal to $\bar{H} = 2/3$, to match the population share of

[8] We restrict the sample to only African Americans and white individuals.

neighborhood A described above. Finally, the mean of the wage shock ε is normalized to $\mu_\varepsilon = 1$.

Internally calibrated parameters. The eleven internally calibrated parameters include the wage process parameters (α, β, γ, ω, σ_ε), the ability process parameters (μ_a, ρ, σ_a), the taste shock scale σ_ζ, the homophily parameter κ, and the racial neighborhood wedge τ. The eleven parameters are calibrated by targeting the sixteen moments reported in Table 1. Panel B of Table 2 reports the calibrated values.

Calibration targets. Our sixteen targets, reported in Table 1, capture key features of the U.S. economy along four dimensions: income inequality, intergenerational mobility, the returns to neighborhood quality, and the dynamics of residential segregation.

The first target is the Gini coefficient in the 1960 steady state, computed from Census data, as a measure of income inequality.

The second target is the rank-rank correlation between parental and children's income. We target the estimate of 0.34 from Chetty et al. (2014).[9] Since this statistic spans several decades, we map it in the model to the average rank-rank correlation over the transition periods 1970–2010.

The third target captures the causal effect of neighborhood quality on children's income. We use the county-level exposure effect estimates from Chetty and Hendren (2018b), who exploit variation in the age at which children move across counties to identify the causal effect of growing up in a better neighborhood.[10] For each MSA, we compute the average income gain from moving a child out of the county with the lowest estimated exposure effect to any of the remaining counties within the same MSA, that is, the difference between the average of the county-level coefficients and the coefficient of the worst county. We then average this gain across all MSAs. In the model, this maps to $\gamma(\log S_A - \log S_B)$, the expected log-income gain from growing up in neighborhood A relative to B, averaged over the transition.

The fourth target is the ratio of the rent in neighborhood A to average city income in the 1960 steady state, which we set to 0.08 using Census housing data.

The remaining twelve targets are the time series of the dissimilarity index by race and the dissimilarity

[9] Chetty et al. (2014) use administrative tax records for children born between 1980 and 1982, measuring parental income as mean family income between 1996 and 2000 and children's income as mean family income between 2011 and 2012, when the children are approximately 30 years old.

[10] Chetty and Hendren (2018b) use tax return data for children born between 1980 and 1986 and effectively regress children's income ranks at age 26 on the interaction of county fixed effects and the fraction of childhood spent in each county. The identification assumption is that children's future income is orthogonal to the age at which they move.

index by income, each measured at the metropolitan level from 1960 to 2010. As documented in Section 2, residential segregation by race declined substantially over this period (from 0.79 to 0.58), while segregation by income increased (from 0.307 to 0.376).

Table 1: *Calibration Targets*

Description	Data	Model	Source
Gini coefficient, 1960	0.34	0.39	Census
Rank-rank correlation	0.34	0.36	Chetty et al. (2014)
Exposure effect	0.13	0.18	Chetty and Hendren (2018b)
R_A / avg. city income, 1960	0.08	0.14	Census
Dissimilarity by race, 1960	0.79	0.78	Census
Dissimilarity by race, 1970	0.78	0.76	Census
Dissimilarity by race, 1980	0.73	0.74	Census
Dissimilarity by race, 1990	0.67	0.69	Census
Dissimilarity by race, 2000	0.64	0.66	Census
Dissimilarity by race, 2010	0.58	0.62	Census
Dissimilarity by income, 1960	0.31	0.28	Census
Dissimilarity by income, 1970	0.30	0.30	Census
Dissimilarity by income, 1980	0.31	0.31	Census
Dissimilarity by income, 1990	0.35	0.36	Census
Dissimilarity by income, 2000	0.36	0.38	Census
Dissimilarity by income, 2010	0.38	0.41	Census

Table 2 reports the calibrated parameter values. The spillover composition weight $\omega = 0.10$ implies that spillovers are primarily driven by the average ability of children in the neighborhood rather than average parental income. The wage persistence parameter $\beta = 0.24$ and the ability coefficient $\alpha = 0.186$ jointly govern intergenerational income transmission. The homophily parameter $\kappa = 0.23$ generates a meaningful preference for same-race neighbors that contributes to racial segregation alongside the endogenous racial bias. The racial neighborhood wedge $\tau = 2.323$ captures the initial distortion imposed by racial covenants in the 1960 steady state.

4.3 Dynamic Effects of Lifting the Racial Neighborhood Wedge

We now examine the response of the economy to the lifting of the racial neighborhood wedge. As we explained above, we assume that in 1960 the economy is in steady state with the racial neighborhood wedge in place and, at the end of the period, the wedge is unexpectedly lifted and permanently set to 0.

Figure 8 illustrates the distributions of ability and wages in the steady state with the racial neighborhood

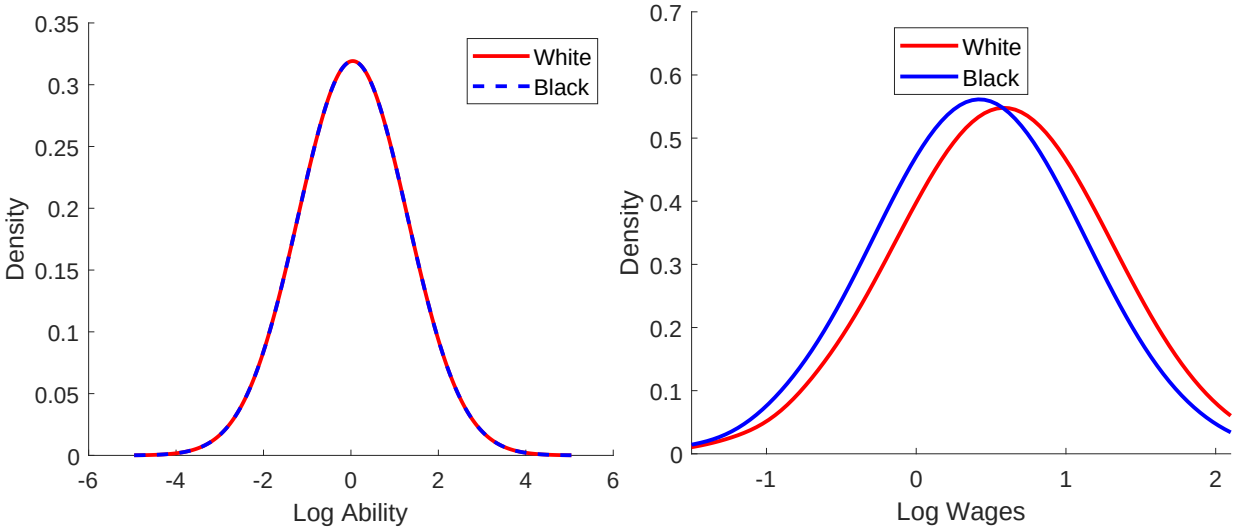
Table 2: *Parameters*

Panel A: Externally Matched Parameters		
Parameter	Value	Description
μ	0.150	Share of Black population
$\bar{H}$	0.67	Housing supply in A
Panel B: Internally Calibrated Parameters		
Parameter	Value	Description
α	0.186	Ability coefficient
β	0.240	Wage persistence
γ	0.510	Spillover exponent
ω	0.100	Weight on avg. income in spillover
σ_ε	0.639	St. dev. of log wage shock
μ_a	0.042	Mean of log ability
ρ	0.500	Persistence of log ability
σ_a	1.083	St. dev. of log ability
σ_ζ	0.0005	Scale of neighborhood taste shock
κ	0.230	Homophily strength
τ	2.323	Racial neighborhood wedge

wedge. In Panel (a), we display the distribution of log ability, which is identical for both white and black agents. In Panel (b), we show the steady state wage distribution in 1960, where, due to the racial neighborhood wedge, the black agents start with an income distribution shifted to the left relative to the white, establishing an initial steady state wage gap. The central question we investigate is the contribution of different factors in explaining the persistence of the wage gap after lifting the racial neighborhood wedge.

Figure 9 illustrates the residential choice probabilities as a function of income percentile. The probability of choosing neighborhood A is increasing in income, reflecting the fact that only agents who are rich enough can afford to pay the rent in A. Panel (a) shows the steady state with the racial neighborhood wedge in place. White agents choose A above approximately the 20th–25th income percentile, while the covenant makes neighborhood A prohibitively expensive for black agents, whose choice probability remains at zero across the entire income distribution. Panel (b) shows the choice probabilities immediately after the covenant is lifted. Black agents can now access neighborhood A, but their income threshold is much higher than that of white agents. This gap is driven by three forces: homophily, which generates a preference for living near agents of the same race; the initial income gap, which means that only the richest

Figure 8: Ability and Wage Distributions in the Steady State with Racial Neighborhood Wedges

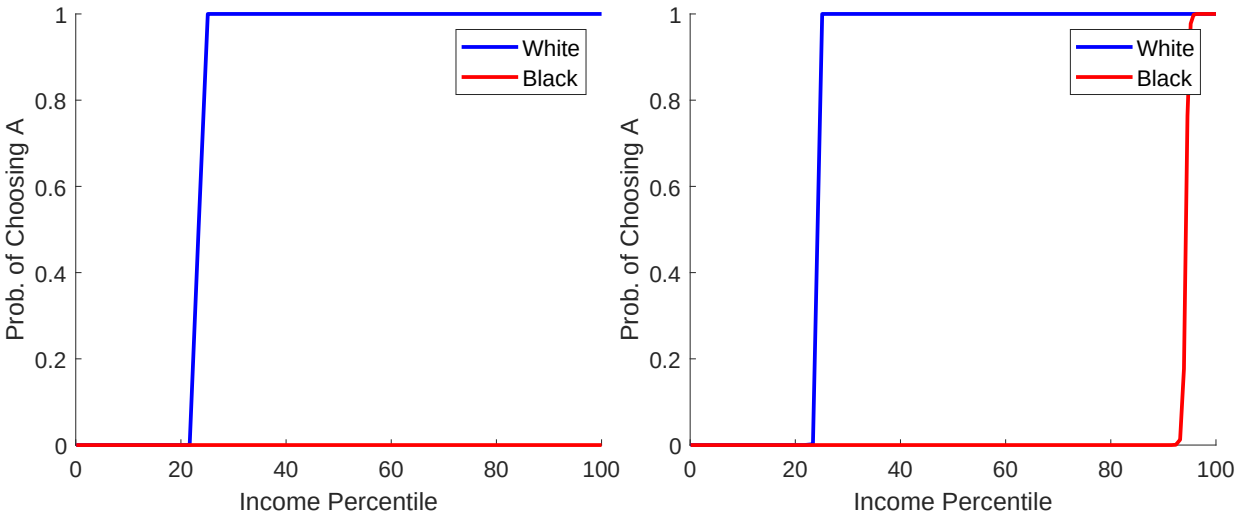


(a) Density of log ability

(b) 1960 Steady State Density of log wages

black agents can afford the rent in A; and the racial bias, which leads white agents to underestimate the spillover in neighborhood B (which has a higher concentration of black agents) and therefore to perceive a larger benefit from living in A, pushing their threshold down.

Figure 9: Residential Choice Probabilities



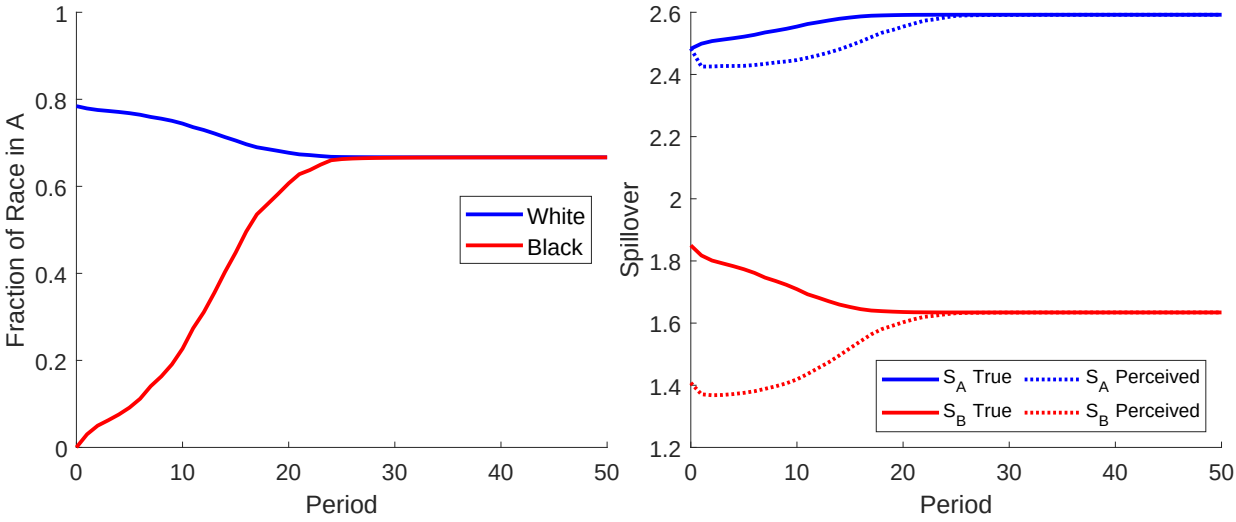
(a) Steady State with Covenant

(b) After Lifting the Covenant

We then examine the evolution of various outcomes along the transitional dynamics after lifting the racial

neighborhood wedge. As discussed in the previous section, lifting the wedge triggers a decline in residential segregation and an increase in residential segregation by income. To understand the mechanism behind this pattern, panel (a) of Figure 10 displays the evolution or racial shares in each neighborhood, which result from evolving residential choices. As the wedge is lifted, living in neighborhood A becomes cheaper for black agents. As a result, the share of black agents living in neighborhood A increases, while that of white agents decreases, resulting in declining racial segregation. Note that, given that the probability of choosing neighborhood A is increasing in income, it is the higher income black agents who move to neighborhood A, while some lower income white agents to move out of neighborhood A and into neighborhood B, resulting in increasing residential segregation by income.

Figure 10: Neighborhood Composition and Spillover Dynamics



(a) Share of Agents in A

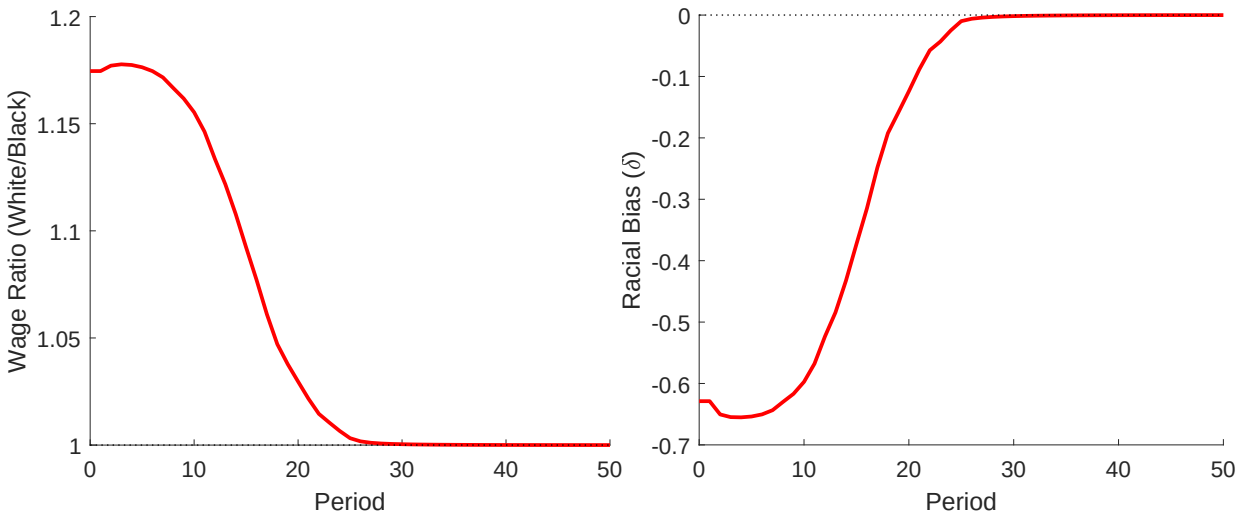
(b) Spillover Dynamics

Panel (b) of Figure 10 helps explain the dynamics by showing the evolution of spillovers. After the racial neighborhood wedge is lifted, the true spillover increases in neighborhood A and declines in B, as higher-income black agents increasingly sort into A, driving up the spillover there, while some lower-income white agents move to B, driving down its spillover. Crucially, white agents' perceived spillovers (dotted lines) diverge from the true spillovers: they underestimate the spillover in neighborhood B, which has a higher concentration of black agents, because they attribute part of the observed income gap to lower ability rather than to differential spillover exposure. This misperception has a direct effect on the speed of transition. Because white agents perceive a larger gap between the spillovers in A and B than actually exists, they are willing to pay higher rents to remain in A. The elevated rent, in turn, raises the income

threshold for accessing neighborhood A, slowing the inflow of black agents and delaying the convergence toward an integrated equilibrium.

Figure 11 summarizes the implications for the wage gap and the racial bias. Panel (a) plots the ratio of average white to average black wages along the transition. Starting from the initial wage gap in the covenant steady state, the wage gap narrows as the economy integrates and eventually converges to one. The distorted beliefs of white agents sustain higher rents in neighborhood A and delay the integration that drives the wage gap to zero. Comparing the model-implied wage ratio in the covenant steady state (approximately 1.17) to the observed ratio in 1960 (approximately 1.79, see Figure 1), the mechanisms in our model (neighborhood externalities, homophily, and racial bias) account for roughly 22% of the observed wage gap between white and Black Americans. The remaining share is attributable to factors outside the model, such as direct discrimination in the labor market, differences in access to education and credit, and other institutional barriers. Panel (b) displays the evolution of the racial bias δ_t, defined as the perceived average ability gap between black and white agents. The bias starts at approximately -0.63, reflecting the large initial income gap that white agents mistakenly attribute to lower black ability. As the economy integrates and the income gap narrows, the bias gradually diminishes and eventually converges to zero. Notably, the bias initially worsens slightly in the first few periods after the covenant is lifted, as the reallocation of higher-income black agents to neighborhood A temporarily widens the income gap among those remaining in B, who are exposed to a lower spillover.

Figure 11: Wage Gap and Racial Bias



(a) Wage Ratio (White/Black)

(b) Racial Bias (δ)

5 Decomposition of Racial Disparities

In this section, we conduct counterfactual exercises to quantify how neighborhood externalities, homophily, and racial bias each contribute to the persistence of racial disparities after lifting the racial neighborhood wedge.

Our decomposition proceeds by progressively shutting down channels of persistence, while holding all other parameters fixed at their values from the calibration in Section 4.2. We consider three cases:

1. **Discrimination model (baseline):** The full model with racial bias and homophily, as calibrated in Section 4.2. White agents have distorted beliefs about the ability distribution of black agents, and both races have a preference for living near agents of the same race.

2. **All rational:** We shut down racial bias by making all agents rational. Unlike the baseline, where white agents do not account for differential neighborhood spillover exposure and therefore misattribute part of the black-white income gap to lower ability, rational agents correctly infer that ability distributions are identical across races and assess the spillovers in both neighborhoods without distortion. Homophily remains active ($\kappa > 0$). The difference between this case and the baseline isolates the contribution of *racial bias*.

3. **All rational, no homophily:** We additionally shut down homophily by setting $\kappa = 0$. The only remaining force for racial segregation is income-based sorting: black agents start with lower average income and are therefore more likely to sort into neighborhood B, where spillovers are lower. The difference between this case and the all-rational case isolates the contribution of *homophily*.

In all three cases, the economy starts from the covenant steady state under the discrimination model calibration, and the racial neighborhood wedge is unexpectedly and permanently lifted at period 0. The three cases share identical initial conditions, differing only in the belief structure and the presence of homophily during the transition.

Figure 12 reports the results. Panel (a) shows the dissimilarity index by race and Panel (b) shows the wage ratio between white and black agents.

Consider first the case with only income-based sorting (all rational, no homophily). Even without racial bias or homophily, racial segregation and the wage gap persist for several periods after lifting the covenant, because the initial income gap causes black agents to be disproportionately concentrated in neighborhood

B. However, both racial dissimilarity and the wage gap decline monotonically and eventually converge to zero. This is because the ability distributions of white and black agents are identical: over time, the identical fundamentals dominate the initial conditions, and the racial income gap vanishes.

Adding homophily (all rational, $\kappa > 0$) substantially slows this convergence. Since agents prefer to live near others of the same race, the initial concentration of black agents in neighborhood B becomes self-reinforcing: the more black agents live in B, the stronger the pull for other black agents to remain there. As a result, both racial dissimilarity and the wage gap are higher at every point along the transition path, and the convergence to equality is markedly slower.

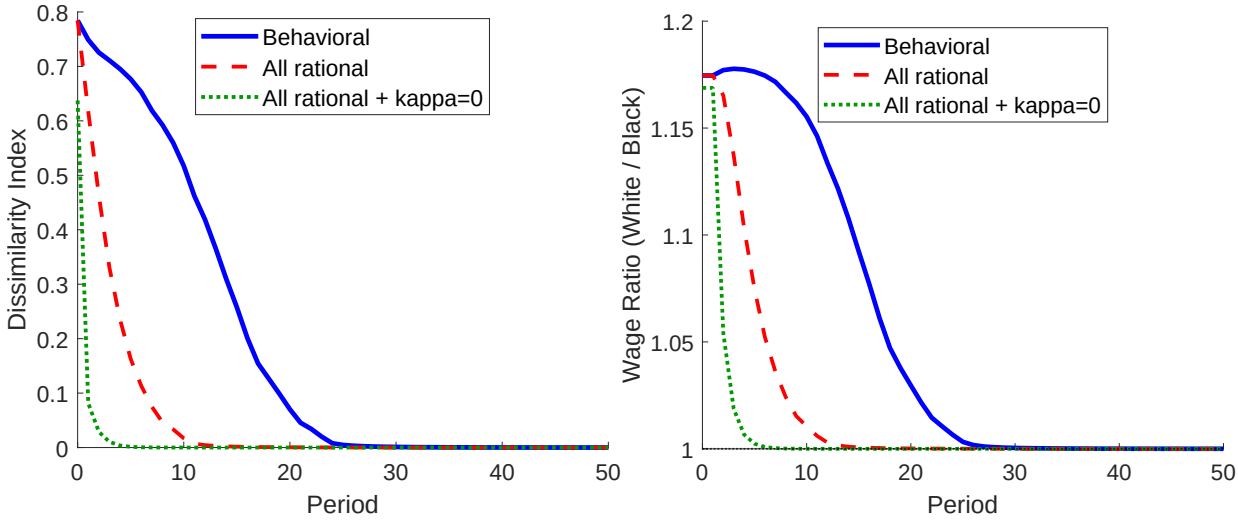
Finally, the full discrimination model with racial bias generates the most persistent disparities. The distorted beliefs of white agents lead them to underestimate the spillover in neighborhood B (which has a higher concentration of black agents) and to overvalue living in neighborhood A. This pushes rents up and further prices out black agents, reinforcing the initial segregation. The key mechanism is the self-reinforcing nature of the bias: segregation generates an observed income gap, which white agents attribute to differences in ability rather than differential exposure to spillovers, which in turn perpetuates the segregation that gives rise to the gap. Although the wage gap and racial dissimilarity eventually converge to zero in all three cases (since ability distributions are identical across races), the convergence under discrimination is substantially slower, with disparities persisting for many more periods than in the other two cases.

Comparing the three cases, the decomposition reveals that income-based sorting through neighborhood externalities accounts for the initial persistence of racial disparities, but its effect is transitory. Homophily amplifies and prolongs the adjustment. The endogenous racial bias further slows convergence by distorting the beliefs of white agents, generating a self-reinforcing feedback loop between segregation, biased perceptions, and economic inequality that sustains racial disparities well beyond what either income-based sorting or homophily alone would produce.

6 Comparative Statics

In this section, we examine how the key parameters of the model shape the magnitude and persistence of racial disparities. We focus on the spillover exponent γ, which governs the sensitivity of children's income to neighborhood quality, and the racial neighborhood wedge τ, which controls the size of the initial distortion. Throughout, we compare the discrimination and rational models, with and without homophily,

Figure 12: Contribution of Racial Bias and Homophily to Persistence



(a) Racial Dissimilarity (b) Wage Gap

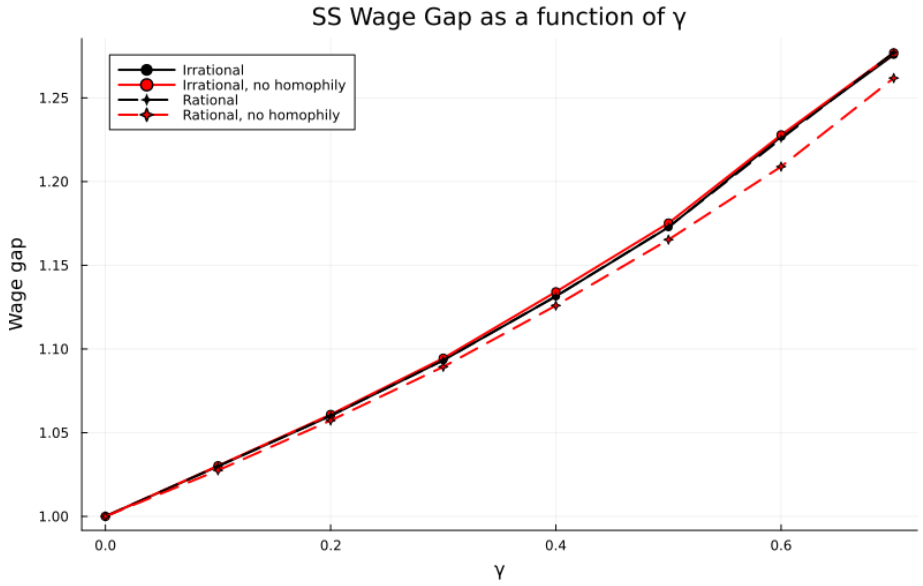
to isolate the contribution of each channel.

6.1 Steady State Wage Gap and the Spillover Exponent

We begin by examining how the steady state wage gap depends on γ. Figure 13 plots the ratio of average white to average black wages in the covenant steady state as a function of γ, for four model variants: the discrimination model with and without homophily, and the rational model with and without homophily.

The wage gap is monotonically increasing in γ across all four variants, rising from 1.0 when $\gamma = 0$ (no spillovers) to approximately 1.28 when $\gamma = 0.7$: stronger neighborhood spillovers amplify the initial income disadvantage of black agents, who are disproportionately concentrated in the lower-spillover neighborhood B due to the covenant. Notably, the four model variants produce very similar wage gaps in the covenant steady state, with only small differences visible at high values of γ. This is because the covenant itself is the dominant force generating the wage gap in steady state: it directly prevents black agents from accessing the higher-spillover neighborhood. The discrimination and rational models differ in their beliefs, but with the covenant in place, both generate similar residential patterns. The differences between models become important during the transition after the covenant is lifted, as we examine next.

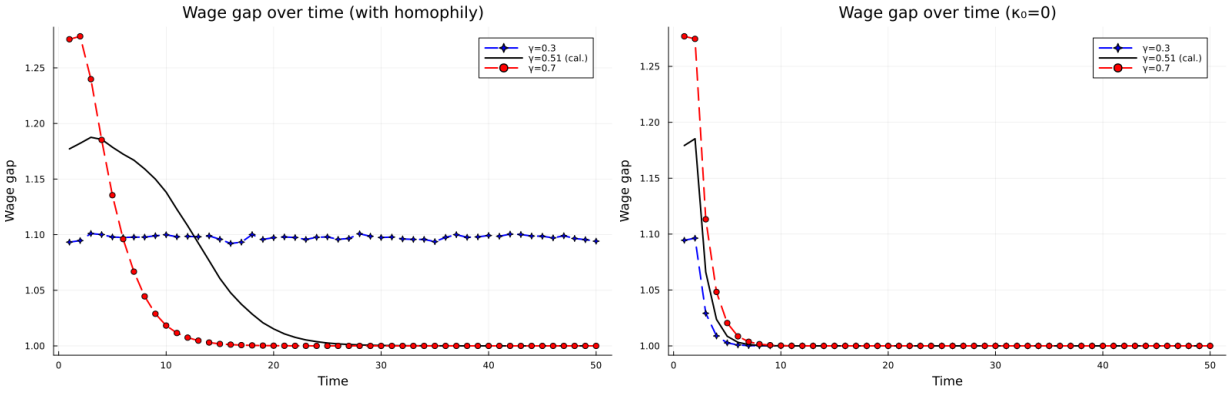
Figure 13: Steady State Wage Gap as a Function of γ



6.2 Transition Dynamics for Different Spillover Exponents

We next examine how γ affects the speed of convergence after lifting the racial neighborhood wedge. Figure 14 plots the evolution of the wage gap along the transition path for three values of γ (0.3, 0.51 (the calibrated value), and 0.7), with homophily (Panel (a)) and without homophily (Panel (b)).

Figure 14: Wage Gap Transition Dynamics for Different γ



(a) With Homophily

(b) Without Homophily

Panel (a) reveals a striking non-monotonicity in the interaction between γ and homophily. When γ is low ($\gamma = 0.3$), the wage gap persists indefinitely at approximately 1.10: the economy appears trapped in a segregated equilibrium. Because spillovers contribute little to income, agents have weak economic

incentives to move to the higher-spillover neighborhood, and homophily (the preference for living near agents of the same race) is sufficient to sustain residential segregation and a permanent wage gap. At the calibrated value ($\gamma = 0.51$), the wage gap eventually closes, but convergence is slow, taking approximately 35 periods. When γ is high ($\gamma = 0.7$), convergence is markedly faster despite the larger initial wage gap: the strong economic incentive to access the higher-spillover neighborhood eventually overcomes homophily, driving integration and closing the wage gap within about 20 periods.

Panel (b) shows that removing homophily ($\kappa = 0$) transforms the dynamics. All three values of γ now converge rapidly to a wage ratio of one, with the gap closing within approximately 5–10 periods. This comparison highlights the central role of homophily in generating persistent racial disparities: without it, even the discrimination model converges quickly, as the economic incentive to integrate is unopposed. With homophily, convergence requires that the economic gains from better spillovers are large enough to overcome the preference for same-race neighbors, a condition that is satisfied only when γ is sufficiently high.

7 Policy Intervention

In this section, we explore whether a one-time redistributive policy can accelerate convergence toward racial equality. The exercise is motivated by the observation that, even after lifting the racial neighborhood wedge, the economy transitions slowly toward integration due to income-based sorting, homophily, and, in the discrimination model, racial bias. A well-designed transfer could break this inertia by enabling black agents to access neighborhood A sooner, thereby improving their exposure to spillovers and triggering a self-reinforcing cycle of economic improvement.

We consider a one-time proportional income tax τ_{pol} levied on all agents, with the proceeds redistributed as a lump-sum transfer. The policy is implemented six periods after the covenant is lifted, at which point the economy has begun its transition but racial disparities remain substantial. The total tax revenue is $R = \tau_{pol}\left[(1-\mu)E[w|\chi = w] + \mu E[w|\chi = b]\right]$, and we set $\tau_{pol} = 0.05$. The tax affects consumption in the period of implementation but does not directly alter the wage process. We compare two redistribution designs:

1. **Race-targeted rebate:** The entire revenue is redistributed as a lump-sum transfer to black agents only, so that each black agent receives $T_b = R/\mu$.

2. **Poverty-targeted rebate:** The revenue is redistributed equally among all agents (regardless of race) whose income falls below the 20th percentile of the overall income distribution.

For each design, we simulate the economy under both the discrimination and rational models, and compare the outcomes to the no-policy baseline. For the rational model, we recalibrate the parameters to target the same moments reported in Table 1, but without any behavioral agents, that is, both black and white agents correctly infer the spillovers in both neighborhoods.[11]

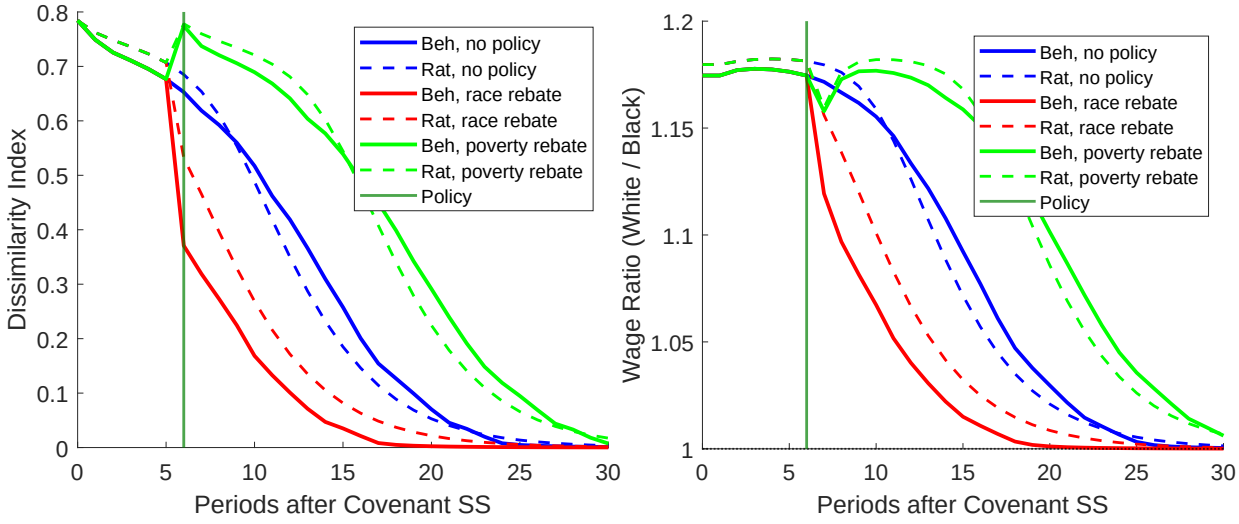
Figure 15 reports the results. Panel (a) shows the evolution of racial dissimilarity and Panel (b) shows the wage ratio between white and black agents. In the no-policy baseline (blue lines), both models converge gradually toward integration, with the discrimination model exhibiting a slower transition. The race-targeted rebate (red lines) accelerates convergence substantially: by transferring resources directly to black agents, it enables them to afford neighborhood A sooner, which improves their spillover exposure and raises their wages. This triggers a virtuous cycle in which higher black incomes further reduce racial segregation and, in the discrimination model, erode the racial bias, as the narrowing income gap gives white agents less basis for misattributing the gap to ability differences. The poverty-targeted rebate (green lines), by contrast, actually slows the transition relative to the no-policy baseline. Because the transfers go to all low-income agents regardless of race, they disproportionately benefit low-income white agents, widening the wage gap and slowing down convergence. Both policies demonstrate that a single, temporary intervention can have lasting effects by breaking the feedback loop between segregation, income gaps, and biased beliefs.

8 Conclusion

This paper investigates how residential segregation contributes to the persistence of racial economic disparities in the United States. We first document that the earnings gap between black and white Americans is larger and more persistent in metropolitan areas with higher residential segregation, both by race and by income. Motivated by this evidence, we develop a general equilibrium overlapping generations model in which residential segregation and racial bias arise endogenously from the interaction of neighborhood spillovers, income-based sorting, homophily, and a behavioral assumption about how white agents form beliefs about the ability of black agents. The key mechanism is that white agents, observing lower average

[11]The recalibrated rational-model parameters are: $\alpha = 0.186$, $\beta = 0.219$, $\gamma = 0.550$, $\omega = 0.100$, $\sigma_\varepsilon = 0.669$, $\mu_a = 0.037$, $\rho = 0.500$, $\sigma_a = 1.083$, $\sigma_\zeta = 0.010$, $\kappa = 0.300$, $\tau = 1.936$.

Figure 15: Policy Intervention: One-Time Redistributive Tax



(a) Dissimilarity by Race

(b) Wage Gap

income among black agents, attribute part of this gap to lower ability rather than to differential exposure to neighborhood spillovers, generating an endogenous racial bias that distorts residential choices and perpetuates the very segregation that gives rise to the gap.

We calibrate the model to match the evolution of racial and income segregation in U.S. metropolitan areas from 1960 to 2010, as well as measures of income inequality, intergenerational mobility, and the causal effect of neighborhood quality on children's outcomes. Comparing the model-implied wage gap to the data, we find that neighborhood externalities, homophily, and racial bias account for approximately 22% of the observed earnings gap between white and Black Americans, with the remainder attributable to forces outside the model such as labor market discrimination and differences in access to education and credit.

Our decomposition exercise reveals that income-based sorting through neighborhood externalities generates transient persistence in racial disparities, while homophily amplifies and prolongs the adjustment. The endogenous racial bias further slows convergence by creating a self-reinforcing feedback loop: segregation generates an observed income gap, which white agents misattribute to ability differences, which in turn sustains the segregation that gives rise to the gap. Although all three cases eventually converge to racial equality (since ability distributions are identical across races), the convergence under discrimination is substantially slower.

Finally, we explore one-time redistributive policies and show that policy design matters. A race-targeted

rebate, which transfers tax revenue to black agents, accelerates convergence by directly enabling black agents to access better neighborhoods and benefit from higher spillovers. This triggers a virtuous cycle in which higher black incomes reduce segregation and erode the racial bias, demonstrating that well-designed temporary policies can have lasting effects by breaking the feedback loop between segregation, biased beliefs, and economic inequality. A poverty-targeted rebate, by contrast, can slow the transition by subsidizing low-income agents of both races and reducing the incentive for residential reallocation, highlighting the importance of targeting in the design of redistributive interventions.

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