Macroeconomics of Racial Disparities: Discrimination, Labor Market, and Wealth

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Preliminary results

Abstract

Our study investigates the effects of racial discrimination on employment, wages, and wealth between black and white workers in a frictional labor market, using a search-and-matching model with prejudiced and non-prejudiced firms. We find that discrimination deepens racial wage and wealth disparities, particularly affecting productive black workers. Market discrimination, modeled as prejudiced hiring practices, paradoxically lowers overall welfare when eliminated, as prejudiced firms favor white workers and contribute to the aggregate economy at the expense of black workers. Additionally, non-market discrimination - unequal bargaining, biased production, and wealth shocks - reduces output and black workers' labor market participation, impacting white workers' welfare when mitigated. Discrimination significantly influences wealth accumulation, which in turn affects wage disparities. This research highlights the complex relationship between discrimination, labor market functionality, and wealth distribution, shedding light on persistent racial disparities in the U.S.

JEL classification: D14, E21, J15, J64, J65

Keywords: search-and-matching, racial inequality, unemployment, wealth distribution

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1 Introduction

Researchers have long studied the labor market differentials between black and white workers (e.g. Becker, 1957; Couch and Fairlie, 2010; Biddle and Hamermesh, 2013; Kuhn, Schularick, and Steins, 2020; Derenoncourt and Montialoux, 2021). Most economics research approaches the racial gaps in isolated domains based on taste and statistical discrimination (Lang and Spitzer, 2020). This suggests that if there is no difference between black and white workers, market competition will drive out discriminatory practices. However, resume studies offer counter-evidence on the persistence of discriminatory practices based on race (e.g. Bertrand and Mullainathan, 2004). The labor income and wealth gaps between black and white households persist, even after the Civil Rights Movement Era (e.g. Cajner, Radler, Ratner, and Vidangos, 2017; Derenoncourt, Kim, Kuhn, and Schularick, 2023). Lang and Spitzer (2020) and Small and Pager (2020) argue that real-world discrimination self-reinforces across domains. Yet, how discrimination from different sources and sectors of the economy interact is largely unknown. This paper fills the gap by examining the transmission of market and non-market racial discrimination across various sectors of the economy and how it sustains racial disparities in labor income and wealth.

This paper provides three key findings. First, discriminatory hiring persists in a competitive equilibrium because of market friction. Though costly to maintain prejudiced hiring practices, discrimination creates segmented labor markets. Frictional unemployment supplies white workers to sustain the prejudiced segment. Second, non-market discrimination not only depresses black worker welfare but also reduces aggregate outcomes. Such discrimination is exemplified by depressed bargaining power and higher uncertainty in personal wealth accumulation. Black workers are discouraged from labor market participation and competition for higher wage outcomes. Lastly, wealth and labor market disparities mutually exacerbate. Labor market disparities spill over to a disadvantage for black workers' wealth accumulation. Racial wealth disparity further exacerbates labor market disparity, as black workers with lower wealth are disadvantaged in self-insurance against adverse labor market

outcomes.

We construct a heterogeneous agent labor market search-and-matching model with incomplete markets. Firms operate in a racially prejudiced market and a non-prejudiced market to hire workers to produce. Prejudiced firms only review white workers for hiring, and non-prejudiced firms hire everyone. Individuals are *ex-ante* different in race, which leads to differences in bargaining power, the possibility of searching for jobs in the two labor markets, and the probability of experiencing a wealth destruction shock. Unemployed workers may qualify for unemployment insurance, and matched worker-and-firm pairs bargain for a wage rate to maximize joined matched surplus. Upon calibration, our model endogenously generates a lower job-finding rate, a higher unemployment rate, and a lower bargained wage for black workers. Without further financial frictions, our model produces significant differences in wealth accumulation between black and white workers.

The main message of this paper is that discrimination is sustained as an equilibrium outcome. Different sources of discrimination have different aggregate implications associated with their unique channels, perpetuating disparate resource allocation within an economy. We consider market discrimination as prejudiced firms dismissing all black workers' job applications, while non-market discrimination manifests through unequal bargaining power, biased production processes, and disparate wealth shocks. We examine the aggregate impact of racial discrimination by comparing the benchmark model with a counterfactual model of removing each type of discrimination. Overall, eliminating market discrimination leads to a welfare improvement for black workers but a reduction of aggregate output and a loss of white worker welfare. Removing non-market discrimination not only raises black workers' welfare but also raises aggregate outputs, though also reducing white workers' welfare. As white workers constitute over 83% of the population, their welfare loss drives the average welfare change of the economy. Changing the allocation of resources between black and white workers does not lead to Pareto Improvement. As a factor contributing to labor market friction, discrimination presents as a form of market failure in our model, which

implies that the market cannot auto-correct racial discrimination.

Market discrimination perpetuates the equilibrium economy through firms' vacancy posting. We raise the posting cost penalty to eliminate the prejudiced firms as a simulation of making discriminatory hiring costly. In response, non-prejudiced firms pick up the market share to hire workers and produce, providing more job opportunities for black workers. Without the prejudiced sector for white workers, both types of workers compete in the same non-prejudiced market for work. It equalizes the racial unemployment rate and vastly reduces the wage gap. Prejudiced hiring accounts for over half of the racial wage gap. However, as white workers lose the additional prejudiced sector of employment opportunities, their unemployment rate increases, and welfare declines. Because of asymmetrical frictions between prejudiced and non-prejudiced labor markets, the new vacancy postings from non-prejudiced firms do not fully account for the lost job opportunities from prejudiced firms. As a result, aggregate production drops.

Non-market discrimination impacts the equilibrium economy through workers' competitive bargaining. We calibrate black workers as having lower bargaining power compared to white workers. Equalizing black workers' bargaining power to white workers directly raises their bargained wage outcomes. However, non-prejudiced firms retain less profit, hence posting fewer vacancies. On the net, it only has a modicum impact on black workers' welfare. The reduction of non-prejudiced sector vacancy posting spills over to welfare reduction for white workers.

Worker's idiosyncratic productivity also embeds information from various sources of non-market discrimination. For example, family and culture, health and education, and neighborhood and policy surveillance contribute to a person's productivity dynamics over time. In our estimation, black workers experience less persistence and more productivity volatility. If we further assign black workers the idiosyncratic productivity processes the same as white workers, our model experiences a drastic increase in aggregate output and welfare gain for black workers. This is because removing non-market discrimination translates into the

labor market as a worker's marginal benefit to firm increases. If non-prejudiced firms hire steady-performing workers, it benefits both the firm and the workers.

Lastly, we equalize racial wealth shocks, assigning black workers the same condition in accumulating wealth as white workers. The effect resembles assigning a higher bargaining power to black workers. This is because of the importance of wealth in self-insuring against uncertain negative outcomes (Nakajima, 2012). Higher personal wealth gives black workers higher reservation value when bargaining with firms. Effectively, black workers can bargain for higher wage outcomes. Similar to assigning a higher bargaining power directly, the more favorable wealth accumulation of black workers also spills over to the firm's unwillingness to post for more vacancies. Indirectly, it reduces white worker's job outcomes and welfare.

This paper contributes to the rising discussion on the aggregate impact of inequality by focusing on the disparate conditions and outcomes of white and black workers. Numerous studies have documented racial differences in pay and employment opportunities (e.g. Becker, 1957; Black, 1995; Coate and Loury, 1993; Rosén, 1997; Bertrand and Mullainathan, 2004). Fewer studies examine the patterns between black and white workers over macroeconomic fluctuations. Among the work, Couch and Fairlie (2010) shows that black workers are last hired in the economic upturn and first fired in the downturn. Biddle and Hamermesh (2013) documents that the discriminatory wage gap between black and white workers is procyclical. Cajner et al. (2017) shows much higher unemployment rate volatility and a higher rate of involuntary part-time employment for black workers. Daly, Hobijn, and Pedtke (2020) suggests that the harsh employment opportunities for black workers are driving up the racial earnings gap.

An emerging strand of literature documents the racial disparities in wealth holdings (e.g. Derenoncourt et al., 2023; Derenoncourt, Kim, Kuhn, and Schularick, 2022; Kuhn et al., 2020; Barsky, Bound, Charles, and Lupton, 2002; McIntosh, Moss, Nunn, and Shambaugh, 2020). Recently, Derenoncourt et al. (2023) provide a historical account of wealth segregation between black and white Americans over the past 150 years. Boerma and Karabarbounis

(2021) and Aliprantis, Carroll, and Young (2023) examine the impact of discriminatory history on earnings, bequest, and capital returns in a steady-state model without aggregate risks. Given the racial wealth difference, Ganong, Jones, Noel, Greig, Farrell, and Wheat (2020) shows that income risks are transmitted differently to individuals of different racial groups. With such understandings, Bartscher, Kuhn, Schularick, and Wachtel (2021) and Lee, Macaluso, and Schwartzman (2021) discuss the disparate consequences of monetary policy on workers of different race groups.

Germane to our project, Nakajima (2021) creates a search-and-matching model framework examining the role of monetary policies in perpetuating racial differences in the labor market. Different from Nakajima (2021), our model intentionally differentiates discriminatory firms from nondiscriminatory firms in the labor market hiring process and examines the impact of discriminatory hiring behaviors on black workers and its spillover effects on the rest of the economy. Our channel decomposition establishes the first theoretical understanding of the interplay of racially disparate labor markets and wealth accumulation processes.

The rest of the paper proceeds as follows. Section 2 lays out theoretical framework. Section 3 discusses the calibration strategy. Section 4 examines the aggregate implications of racial discrimination. Section 5 provides mechanism exploration. Section 6 discusses the implications of aggregate fiscal policies. Section 7 concludes the paper.

2 Model

We construct a search and matching model with two types of firms that post vacancies in a unified labor market to hire workers. Prejudiced firms (p) discriminate against Black workers and only hire White workers. Non-prejudiced firms (np) hire black and white workers without discrimination.

Individual workers are heterogeneous on race (black or white, $Ra = [bl, wh]$), wealth (continuous as $a \in A$), current employment status (working for p or np firms, and unem-

ployed, $e = [p, np, 0]$), current unemployment insurance eligibility status (eligible or not, $el = [1, 0]$), idiosyncratic matched productivity shocks ($s \in S$), and extreme wealth shock, $\epsilon_R \in \{\epsilon_{bl}, \epsilon_{wh}\}$ describing the probability of one's losing wealth to zero. For continuing matched workers, the idiosyncratic productivity evolves as AR(1): $s' = \rho_{s,Ra} s + \epsilon_{s,Ra}$, with $\epsilon_{s,Ra} \overset{iid}{\sim} N(0, \sigma_{s,Ra})$. The AR(1) shocks are race-specific, suggesting the exogenously differential labor market risks perturbing black and white workers. Individual workers are distributed on the $\mu \in \{Ra, e, el, s, a\}$. We set the model period to be quarterly.

2.1 Labor market search and matching

The total number of unemployed workers u is the sum of unemployed black (u_{bl}) and white (u_{wh}) workers. The number of np vacancies available is v_{np}, and number of p firm vacancies is v_p. We define the non-prejudiced market tightness as $\theta_{np} = v_{np}/u$, and the prejudiced market tightness as $\theta_p = v_p/u_{wh}$.

Firms post vacancies to find workers and unemployed persons actively search for jobs. All agents face the same matching function:

$$m = M(u, v) = \gamma u^{\alpha} v^{(1-\alpha)} \tag{1}$$

A unemployed person finding np jobs has job finding probability $f_{np}(\theta_{np}) = M(u, v_{np})/u = \theta_{np}^{(1-\alpha)}$. The vacancy filling probability is: $q(\theta_{np}) = M(u, v_{np})/v_{np} = \gamma \theta_{np}^{-\alpha}$. Similarly, an unemployed white person finding p job has job finding probability $f_p(\theta_p) = M(u_{wh}, v_p)/u_{wh} = \theta_p^{(1-\alpha)}$. The p job vacancy filling probability is: $q(\theta_p) = M(u_{wh}, v_p)/v_p = \gamma \theta_p^{-\alpha}$.

2.2 Unemployment insurance

If a worker loses their job, they may be eligible to receive unemployment insurance. Unemployment insurance is characterized by the benefit b and eligibility el. To avoid tracking a worker's individual history, we model the unemployment insurance as a fraction of the

average wage $\overline{w}(z, Ra, s, a)$ of the same type of worker in the current state of the economy, and the eligibility as a random receiving probability $Pe(z)$, following Setty and Yedid-Levi (2021) and Mitman and Rabinovich (2015).

We set the replacement rate h and maximum benefit level χ. The benefit a person can receive $b(Ra, s, a) = min\{h\overline{w}(Ra, s, a), \chi\}$. The eligibility criteria is set such that a newly unemployed person is guaranteed to receive unemployment insurance. A current unemployed person receiving the insurance faces a probability $Pe(z)$ of receiving unemployment insurance next period. If the person is currently unemployed and ineligible, they will continue to be ineligible.

2.3 Worker's problem

A non-prejudiced firm can employ any worker (W_{np}). Only white workers can work at a prejudiced firm (W_p). Since the unemployment benefit depends on a worker's last employment situation, unemployed workers eligible for unemployment benefits are differentiated on whether a prejudiced (U_p^I) or non-prejudiced (U_{np}^I) firm previously employed them. If a worker loses their benefit, their value becomes U^N.

Each worker has race-dependent subjective discounting β_{Ra} and survival probability η. If one receives the survival shock $1 - \eta$, one is replaced by a new person with zero asset holdings to unemployment without insurance state. Following Krueger, Mitman, and Perri (2016), we assume the deceased's assets pay extra returns to survivors. The adjusted asset returns becomes $(1 + r_\mu)/\eta$.

2.3.1 Employed with np firm

$$W_{np}(\mu; R, s, a) = \max_{c,a'>0} \Big\{ u(c) + \beta E_{\epsilon_R} \sum_{s'} \pi^R_{ss'} [\underbrace{\lambda_{np} U^I_{np}(\mu'; R, s', a')}_{\text{expected unemployment value}} + \underbrace{(1-\lambda_{np}) W_{np}(\mu'; R, s', a')}_{\text{expected continuing employed value}}] \Big\} \tag{2}$$

s.t.

$$c + a' = (1-\tau)\omega_{np}(\mu; R, s, a) + (1+r)a + d$$

Each employed person has value function W_{np}, which is given by the current utility from consumption, $u(c)$, and discounted future value by β_{Ra} adjusted by survival rate η. The person's income is split into consumption c and savings for future a'. Their income comes from savings from before $(1+r)a/\eta$, dividend d, and after-tax labor income $w(\mu; Ra, s, a)(1-\tau_{Ra})$, at labor income tax rate τ_μ.

A working person may receive a job destruction shock, specific to the np firms, at probability λ_{np}. Hence, their possibility of remaining employed next period is $1 - \lambda_{np}$.

2.3.2 Employed with p firm

Prejudiced firms p only hire white workers ($Ra = 2$). The matched worker receives job destruction shock λ_p, specific to p firms. If one loses a job in the next period, one moves to the U^I_p state, where one is unemployed with eligibility for UI. The rest of the model structure is the same as W_{np}.

$$W_p(\mu; wh, s, a) = \max_{c,a'>0} \Big\{ u(c) + \beta E_{\epsilon_{wh}} \sum_{s'} \pi^{wh}_{ss'} [\underbrace{\lambda_p U^I_p(\mu'; wh, s', a')}_{\text{expected unemployment value}} + \underbrace{(1-\lambda_p) W_p(\mu'; wh, s', a')}_{\text{expected continuing employed value}}] \Big\} \tag{3}$$

s.t.

$$c + a' = (1-\tau)\omega_p(\mu; wh, s, a) + (1+r)a + d$$

2.3.3 Unemployed and eligible workers

Since unemployment insurance depends on past wages, the value of a worker's state of UI qualifying state, U^I, depends on p or np history.

White worker from a np firm:

$$
\begin{aligned}
U^I_{np}(\mu; wh, s, a) = \max_{c,a'>0} \Big\{ u(c) + \beta E_{\epsilon_{wh}} \sum_{s'} \pi^{wh}_{ss'} \Big[& \underbrace{(1 - f(\theta_{np}))f(\theta_p) W_p(\mu'; wh, s', a')}_{\text{value of matching with a p sector job only}} \\
& + \underbrace{f(\theta_{np})(1 - f(\theta_p)) W_{np}(\mu'; wh, s', a')}_{\text{value of matching with a np sector job only}} \\
& + \underbrace{f(\theta_{np}) f(\theta_p) \max\{W_p(\mu'; wh, s', a'), W_{np}(\mu'; wh, s', a')\}}_{\text{value of matching with both p and np jobs}} \\
& + \underbrace{(1 - f(\theta_p))(1 - f(\theta_{np}))}_{\text{not matching with any job}} \Big[\underbrace{P_e U^I_{np}(\mu'; wh, s', a')}_{\text{value of continuing UI}} + \underbrace{(1 - P_e) U^N(\mu'; wh, s', a')}_{\text{value of losing UI}} \Big] \Big] \Big\}
\end{aligned} \tag{4}
$$

s.t.

$$
c + a' = (1 - \tau) b_{np}(wh, s, a) + (1 + r)a + d
$$

If a white worker is unemployed from a np firm and is eligible for unemployment insurance, one has value function U^I_{np}. The person has current utility from consumption, $u(c)$, and discounted future survival value. The person's income is similar to an employed person's, except one receives after-tax unemployment benefits $b(1 - \tau)$ than labor income.

An unemployed person actively searches for a job. They have the probability $(1 - f_{np}(\theta_{np}))f_p(\theta_p)$ to find only a p job, probability $f_{np}(\theta_{np})(1 - f_p(\theta_p))$ to find only a np job, probability $(1 - f_p(\theta_p))(1 - f_{np}(\theta_{np}))$ finding no jobs, and probability $f_{np}(\theta_{np})f_p(\theta_p)$ finding job offers from both np and p firms.

If the worker finds no job, they have a probability Pe chance of continuing to receive unemployment benefits and $1 - Pe$ probability of losing it. If a worker finds job offers from both np and p firms, they choose whichever offer provides the larger expected returns.

White worker from a p firm:

Like U^I_{np}, a UI-eligible white worker from a p firm has the value function U^I_p. Since the unemployment benefit for this worker is related to their worker history at the p firm, we track the notation separately rather than mixing it with U^I_{np}.

$$\begin{aligned} U^I_p(\mu; wh, s, a) = \max_{c,a'>0} \Big\{ u(c) + \beta E_{\epsilon_{wh}} \sum_{s'} \pi^{wh}_{ss'} \Big[& \underbrace{(1 - f(\theta_{np}))f(\theta_p)W_p(\mu'; wh, s', a')}_{\text{value of matching with a p sector job only}} \\ & + \underbrace{f(\theta_{np})(1 - f(\theta_p))W_{np}(\mu'; wh, s', a')}_{\text{value of matching with a np sector job only}} \\ & + \underbrace{f(\theta_{np})f(\theta_p)\max\{W_p(\mu'; wh, s', a'), W_{np}(\mu'; wh, s', a')\}}_{\text{value of matching with both p and np jobs}} \\ & + \underbrace{(1 - f(\theta_p))(1 - f(\theta_{np}))}_{\text{not matching with any job}} \Big[\underbrace{P_e U^I_p(\mu'; wh, s', a')}_{\text{value of continuing UI}} + \underbrace{(1 - P_e)U^N(\mu'; wh, s', a')}_{\text{value of losing UI}} \Big] \Big] \Big\} \end{aligned} \tag{5}$$

s.t.

$$c + a' = (1 - \tau)b_p(wh, s, a) + (1 + r)a + d$$

Black worker from a np firm:

Given the firm structure, an unemployed black worker with UI eligible status can only be linked to work history from np firm. They have the value $U^I_{np}(\mu; 1, s, a)$.

$$\begin{aligned} U^I_{np}(\mu; bl, s, a) = \max_{c,a'>0} \Big\{ u(c) + \beta E_{\epsilon_{bl}} \sum_{s'} \pi^{bl}_{ss'} \Big[& \underbrace{f(\theta_{np})W_{np}(\mu'; bl, s', a')}_{\text{value of matching with a np job}} \\ & + \underbrace{(1 - f(\theta_{np}))[P_e U^I_{np}(\mu'; bl, s', a') + (1 - P_e)U^N(\mu'; bl, s', a')]}_{\text{value of continuing unemployed}} \Big] \Big\} \end{aligned} \tag{6}$$

s.t.

$$c + a' = (1 - \tau)b_{np}(bl, s, a) + (1 + r)a + d$$

These workers look for jobs in the np sector while unemployed. They have the probability $f_{np}(\theta_{np})$ finding a job and $1 - f_{np}(\theta_{np})$ remain unemployed. One has a $(1 - Pe)$ probability of losing the unemployment benefit if unemployed.

2.3.4 Unemployed and not eligible worker

If an unemployed eligible worker loses their UI, they move to the not-eligible state. One's work history doesn't matter, as past wages don't enter these equations. However, white workers can find jobs at np and p firms, and black workers can only find jobs at np firms.

White worker:

$$
\begin{aligned}
U^N(\mu; wh, s, a) = \max_{c, a' > 0} \Big\{ u(c) + \beta E_{\epsilon_{wh}} \sum_{s'} \pi_{ss'}^{wh} \Big[& \underbrace{(1 - f(\theta_{np})) f(\theta_p) W_p(\mu'; wh, s', a')}_{\text{value of matching with a p sector job only}} \\
& + \underbrace{f(\theta_{np})(1 - f(\theta_p)) W_{np}(\mu'; wh, s', a')}_{\text{value of matching with a np sector job only}} \\
& + \underbrace{f(\theta_p) f(\theta_{np}) \max\{W_p(\mu'; wh, s', a'), W_{np}(\mu'; wh, s', a')\}}_{\text{value of matching with both np and p sector jobs}} \\
& + \underbrace{(1 - f(\theta_p))(1 - f(\theta_{np})) U^N(\mu'; wh, s', a')}_{\text{value of continuing unemployed}} \Big] \Big\} \\
& \text{s.t.} \\
& c + a' = (1 + r)a + d
\end{aligned}
\tag{7}
$$

The white worker in $U^N(\mu; 2, s, a)$ state has their income only comes from previous savings and lump-sum transfers. Similar to white worker in U^I states, they have a probability $(1 - f_{np}(\theta_{np}))f_p(\theta_p)$ finding only a p firm job, probability $f_{np}(\theta_{np})(1 - f_p(\theta_p))$ finding only a np firm job, probability $(1 - f_p(\theta_p))(1 - f_{np}(\theta_{np}))$ remain unemployed, and probability $f_p(\theta_p)f_{np}(\theta_{np})$ finding jobs in both np and p firms. They choose the higher return one if they find both jobs.

Black worker:

Like a black worker in $U^I_{np}(\mu; 1, s, a)$ state, an unemployed and ineligible black worker can find jobs in np firms with probability $f_{np}(\theta_{np})$. If they fail to find a job, they remain unemployed and ineligible.

$$U^N(\mu; bl, s, a) = \max_{c,a'>0} \Big\{ u(c) + \beta E_{\epsilon_{bl}} \sum_{s'} \pi^{bl}_{ss'} \Big[\underbrace{f(\theta_{np}) W_{np}(\mu'; bl, s', a')}_{\text{value of matching with a np job}} + \underbrace{(1 - f(\theta_{np})) U^N(\mu'; bl, s', a')}_{\text{value of staying unemployed}} \Big] \Big\} \tag{8}$$

s.t.

$$c + a' = (1 + r)a + d$$

2.4 Firm's problem

Firms post vacancies to attract workers for production purposes. Vacant firms have a value of J_0, and producing firms have a value of J. In addition to contemporary values, firms stochastically discount future value using $\frac{1}{1+r_\mu}$.

2.4.1 Vacant np firm

A vacant np firm pays posting cost κ_{np} and searches for all unemployed workers. With probability $q_{np}(\theta_{np})$, they match with a currently unemployed worker. We impose the free entry condition so that they keep on posting vacancies until the expected matched value equals to the vacancy posting cost.

$$\begin{aligned} \kappa_{np} = \Big(\frac{q(\theta_{np})}{1+r}\Big) \int_a \Big\{ \sum_s \sum_{s'} \pi^{bl}_{ss'} \Big[& \underbrace{J_{np}(bl, s', a') \frac{\phi_u(bl, s, a)}{u}}_{\text{value of matching with a type (s,a) black worker}} \Big] \\ + \sum_{s'} \pi^{wh}_{ss'} \Big[& \underbrace{\mathbb{1}_{\{W_p(\mu'; wh, s', a') \le W_{np}(\mu'; wh, s', a')\}}}_{\text{prob of white worker higher value than a p firm}} \Big(\underbrace{J_{np}(wh, s', a') \frac{\phi_u(wh, s, a)}{u}}_{\text{value of matching with (s,a) white worker}} \Big) \\ + & \underbrace{\mathbb{1}_{\{W_p(\mu'; wh, s', a') > W_{np}(\mu'; wh, s', a')\}}}_{\text{prob of white worker lower value than a p firm}} \Big(\underbrace{J_{np}(wh, s', a') \frac{\phi_u(wh, s, a)}{u}}_{\text{value of matching (s,a) worker without competing p offer}} \Big)(1 - f(\theta_p)) \Big] \Big\} da \end{aligned} \tag{9}$$

Upon matching with a worker, the firm has probability $\frac{\phi_u(1,s,a)}{u}$ working with a black worker of specific (s, a) status and proceeding with production in the next period. The firm

has an additional probability $\frac{\phi_u(2,s,a)}{u}$) matched with a white worker of (s,a) status. The production only happens if the white worker receives a more favorable offer from np firm than p firm, or if the worker does not receive a p firm offer.

2.4.2 Vacant p firm

A vacant p firm only searches for unemployed white workers. The firm has probably $q_p(\theta_p)$ matching with a worker. And the worker with specific (s,a) status has probability $\frac{\phi_u(2,s,a)}{u_{wh}}$. Symmetric to the np firm matching with a white worker, production only happens when the worker receives a favorable offer from p firm, or does not receive a np firm offer.

$$\begin{aligned}\kappa_p =&\Big(\frac{q(\theta_p)}{1+r}\Big)\sum_s\sum_{s'}\pi^{wh}_{ss'}\int_a\Big[\underbrace{\mathbb{1}_{\{W_{np}(\mu';wh,s',a')<W_p(\mu';wh,s',a')\}}\Big(J_p(wh,s',a')\frac{\phi_u(wh,s,a)}{u_{wh}}\Big)}_{\text{value of matching with (a,s) white worker, with higher value than np firm}}\\ &+\underbrace{\mathbb{1}_{\{W_p(\mu';wh,s',a')\geq W_{np}(\mu';wh,s',a')\}}\Big(J_p(wh,s',a')\frac{\phi_u(wh,s,a)}{u_{wh}}\Big)(1-f(\theta_{np}))}_{\text{value of matching with (a,s) white worker without competing np firm}}\Big]da\end{aligned} \tag{10}$$

2.4.3 Producing np firm

If a np firm enters production, it earns contemporaneous profit j and discounts future values adjusted by the job destruction rate λ^{np} and the worker's survival rate η.

$$\begin{aligned}J_{np}(\mu;R,s,a) &= \max_k\Big\{j(\mu;R,s,a)+\Big(\frac{1-\lambda^{np}}{1+r}\Big)E_{\epsilon_R}\sum_{s'}\pi^R_{ss'}J_{np}(\mu';R,s',a')\Big\}\\ &\text{where}\\ j(\mu;R,s,a) &= sf(k)-(r+\delta)k-\omega_{np}(\mu;R,s,a)\end{aligned} \tag{11}$$

The matched firm produces output $sf(k)$, pays capital cost $(r_\mu+\delta)k$ and labor cost w. We assume the capital market is frictionless, so all firms pay the same rental rate r, adjusted by the survival probability η. The marginal product equalizes across firms. Capital k depreciates according to δ.

2.5 Producing p firm

Symmetric to the producing np firm, the producing p firm pays capital and labor costs and discounts future production value adjusted by the worker's survival (η) and job destruction (λ^p) rates.

$$J_p(\mu; wh, s, a) = \max_k \Big\{ j(\mu; wh, s, a) + \Big(\frac{1-\lambda^p}{1+r}\Big) E_{\epsilon_{wh}} \sum_{s'} \pi_{ss'}^{wh} J_p(\mu'; wh, s', a') \Big\}$$

where

$$j(\mu; wh, s, a) = sf(k) - (r+\delta)k - \omega_p(\mu; wh, s, a) \tag{12}$$

2.6 Bargaining

Firms and workers bargain for wage period-by-period that maximizes the joint outcome. Workers have bargaining power ξ_{Ra}, differentiated by race. The bargaining solution has:

$$\omega_{np}(\mu; Ra, s, a) = argmax_\omega (W_{np}(\mu; Ra, s, a) - U_{np}^I(\mu; Ra, s, a))^{\xi_{Ra}} J_{np}(\mu; Ra, s, a)^{(1-\xi_{Ra})} \tag{13}$$

$$\omega_p(\mu; 2, s, a) = argmax_\omega (W_p(\mu; 2, s, a) - U_p^I(\mu; 2, s, a))^{\xi_2} J_{np}(\mu; 2, s, a)^{(1-\xi_2)} \tag{14}$$

2.7 Equilibrium

In equilibrium, all net savings supply to the firm's capital demand. All contemporaneous profits are distributed back to individuals equally as dividends. The government balances tax revenue and unemployment insurance outgo, by imposing additional lump-sum tax or transfers on individuals equally.

3 Calibration

We have two categories of parameters for this model. One set is externally chosen, and the other is internally calibrated to match the relevant data moments. Table 1 reports the parameters and the choice rationale.

Table 1: Calibration and targeted statistics

Parameter	Value	Description	Target statistics	data	model
Chosen internally					
β	0.9995	subjective discounting	K/Y	12.76	12.76
γ	0.5259	matching efficiency	job finding rate - black	0.4946	0.4946
κ_p	8.4274	p sector vacancy posting cost	job finding rate - white	0.6599	0.6599
κ_{np}	2.3247	np sector vacancy posting cost	market tightness	1	1
λ_p	0.0268	p sector job destruction shock	job separation rate - white	0.03795	0.03795
λ_{np}	0.0644	np sector job destruction shock	job separation rate - black	0.0644	0.0644
ξ_{wh}	0.1853	bargaining power - white	firm profit share	0.033	0.033
ξ_{bl}	0.1561	bargaining power - black	racial wage ratio	0.75	0.75
ϵ_{wh}	0.0112	extreme wealth shock - white	zero wealth - white	0.06	0.06
ϵ_{bl}	0.0212	extreme wealth shock - black	zero wealth - black	0.18	0.13
Chosen externally					
α	0.6600	elasticity of labor matching	Nakajima (2012)		
θ_n	0.2890	capital share of output	Nakajima (2012)		
δ	0.0150	quarterly depreciation rate	Nakajima (2012)		
ρ_{wh}	0.9395	persistence of shock - white	PSID		
σ_{wh}	0.1633	innovation of shock - white	PSID		
ρ_{bl}	0.9198	persistence of shock - black	PSID		
σ_{bl}	0.1650	innovation of shock - black	PSID		
h	0.4	UI replacement rate	Mitman and Rabinovich (2015)		
ξ	0.8714	maximum UI coverage	Setty and Yedid-Levi (2021) 48% median wage		
Pe	0.5385	probability of UI eligibility	maximum weeks of eligibility		

Notes: This table reports the parameters, their values, and descriptions. The top panel presents the parameters chosen internally by minimizing the distance between model-generated moments and data. The last two columns of the top panel compare the targeted moments between data and model-simulated values. The bottom panel reports the parameters chosen externally of the model, their values, and descriptions.

We set individual production function $y = k^\theta$. The capital share of output, θ, is set to be 0.289, following Nakajima (2012). The capital depreciation rate, δ, is set to be 0.015 to match the quarterly depreciation rate, reported by Nakajima (2012). The idiosyncratic labor productivity follows an AR(1) process. We set the persistence ρ and innovation σ to be 0.9395 and 0.1633 for white workers and 0.9198 and 0.1650 for black workers. We estimated this process from PSID by controlling for experience, education, year, state, marital status, and race, following Setty and Yedid-Levi (2021). The benchmark unemployment insurance

replacement rate is set to be 40% of the counterfactual wage rate, following Mitman and Rabinovich (2015). The maximum unemployment insurance payout is 48% of the median wage, following Setty and Yedid-Levi (2021), and lasts 26 weeks.

The remaining parameters are chosen internally by solving and simulating the model to match relevant data moments. We set the subjective discounting, β to be 0.9995. It is chosen to match the quarterly capital-to-output ratio of 12.76. γ is the matching efficiency, set to 0.5259 to match the black worker job findings rate. Related, λ_{np} and λ_p are set with values 0.0268 and 0.0644 to match the job separation rate for white and black workers. μ_{wh} and μ_{bl} represent the bargaining power for white and black workers (0.1584 and 0.0723). The vacancy posting cost, κ_{np}, is 2.3247 to match the tightness of the overall labor market (Wolcott, 2021). The extreme wealth shocks are chosen to match the share of each demographic group at zero wealth estimated from SCF following Nakajima (2021).

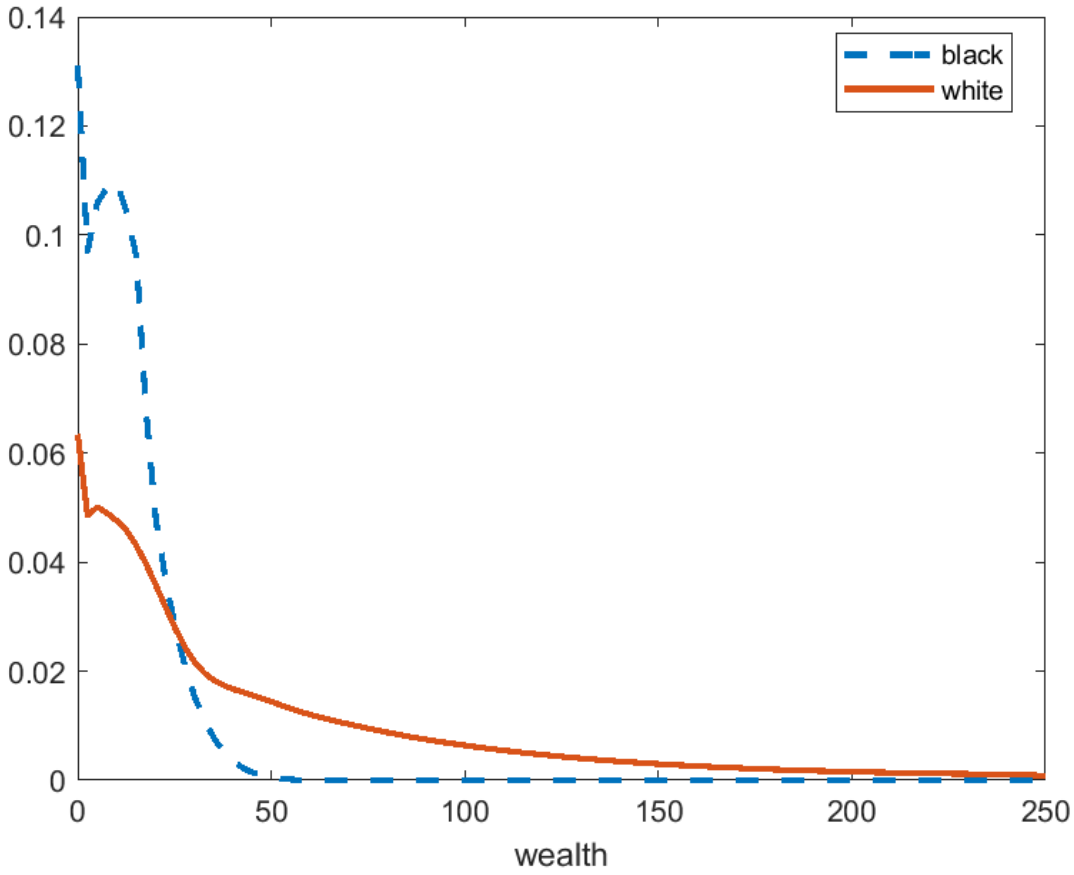
3.1 Racial difference in wealth distribution

Numerous research has documented the racial wealth disparity in the US (e.g. Kuhn et al., 2020; Barsky et al., 2002; McIntosh et al., 2020; Derenoncourt et al., 2023). Ganong et al. (2020) shows that income shocks are transmitted differently to individuals of different racial groups. This subsection examines the transmission of institutional discrimination from the labor market to disparate wealth distribution between black and white workers.

Without further frictions on the financial market, and with the same idiosyncratic labor productivity process, the model still generates a wealth holding of 82% by white workers, similar to the reporting from McIntosh et al. (2020).

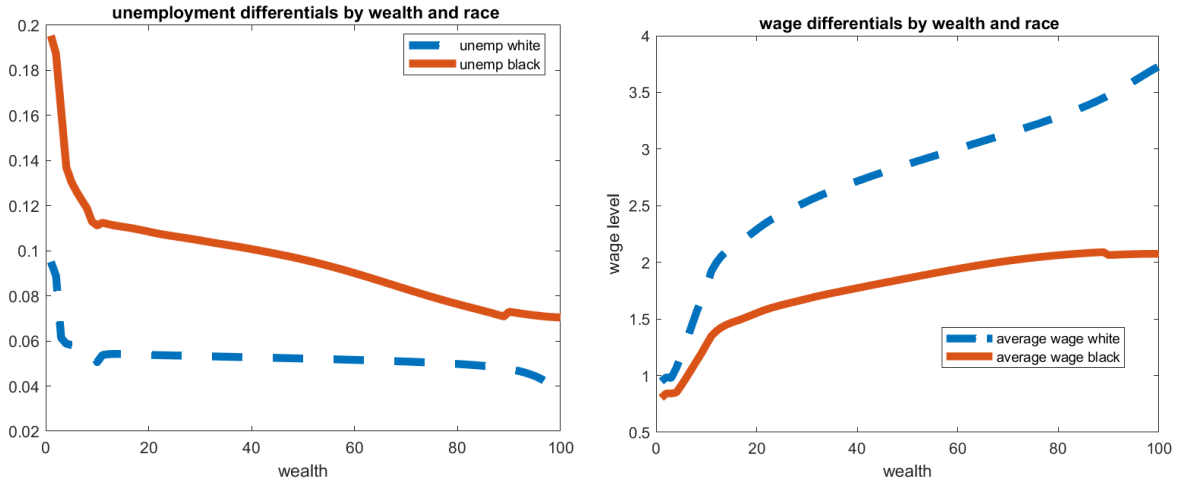
Figure 1 presents the distribution of black and white workers on wealth. White workers are distributed to the higher end of the wealth dimension than black workers, while black workers concentrate around the lower bound of the wealth axis. This is because black workers have twice the job separation rate, half the job finding rate, and 75% wage rate than white workers. Black workers also experience nearly twice the chance of losing all wealth. Given

Figure 1: Wealth distributions



Notes: This figure compares the model simulated distribution of workers on wealth dimension by race

Figure 2: labour market outcomes by wealth and race



(a) (b)

Notes: This figure compares model simulated unemployment rate and average wage of workers on wealth dimension by race

the risk, black workers are much disadvantaged in accumulating wealth. Labor market and wealth discrimination generate differences in wealth accumulation among black individuals, even without additional layers of financial friction.

3.2 Racial difference in the labor market by wealth

In this subsection, we further decompose the differences in labor market outcomes caused by discrimination in the labor market matching process.

Figure 2 describes the racial differences in the unemployment rate and average wage along the wealth dimension. Panel (a) shows that black workers have a higher unemployment rate across the wealth spectrum. Interestingly, the unemployment rate gap is higher for individuals in the middle-wealth region. Panel (b) shows the wage differentials between black and white workers. As wealth increases, individuals have higher bargaining power in negotiating wages. The racial wage gap, however, exacerbates as wealth increases. The wage rates are similar between black and white workers at the lower end of wealth. Black workers' wage rate is about 90% of white workers. But the differences increase to be over 20% at the

upper end.

4 Aggregate Implications of Discrimination

In this section, we explore the aggregate effects of racial discrimination on the economy and examine the aggregate outcomes and welfare implications from various sources of discrimination. We look at the impact of market discrimination from prejudiced firms completely dismissing black workers in the job search-and-matching process. We also compare the impact of non-market discrimination, including factors such as bargaining power, AR(1) processes, and wealth shocks. These are structural disparities from historical, social, and political aspects of the US society. Table 2 compares aggregate outcomes, including average wage, overall unemployment rate, capital-to-output ratio, aggregate output, and average welfare change between economies with various sources of discrimination.

We calculate the welfare change following Krusell, Mukoyama, and Şahin (2010). Under the benchmark model, we let $V(e, R, s, a)$ be the maximal value of the individual with employment status e, race R, productivity s, and asset a. For any given state realization:

$$V = \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\sigma}}{1-\sigma}$$

Under an alternate economy, let $\tilde{V}(e, R, s, a)$ be the maximal value.

$$\tilde{V} = \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{\tilde{c}_t^{1-\sigma}}{1-\sigma}$$

We examine the welfare change between the two economies through consumption equivalence Ω, following the equation:

$$\mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{((1+\Omega)c_t)^{1-\sigma}}{1-\sigma} = \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{\tilde{c}_t^{1-\sigma}}{1-\sigma}$$

Given, the CRRA utility function, we derive Ω as:

$$\Omega = \left(\frac{\tilde{V}}{V}\right)^{\frac{1}{1-\sigma}} - 1$$

This expression is similar to Krusell et al. (2010), which derives this for log utility where $\Omega = \exp((\tilde{V} - V)(1-\beta)) - 1$. For each alternate economy, we sum over all individual-level consumption equivalence, Ωs, using the distribution of the benchmark economy to calculate the average welfare change.

In Column 2 of Table 2, we raise the vacancy posting cost κ_p to 3000 from benchmark 8.4, making it much more costly to practice prejudiced hiring. Compared to benchmark values in Column 1, average wage, capital-to-output ratio, and output drop. The overall unemployment rate increases. Associatedly, average welfare dropped by 9%, driven by the decline of average white worker welfare of 11.6%. However, making prejudiced hiring costly does improve black worker welfare by 2.6% on average.

Table 2: Aggregate Impact of Racial Discrimination

		Market	Non-Market		
	Benchmark	$\kappa_p = 3000$	$\xi_{bl} = \xi_{wh}$	ξ and $AR(1)$	$\epsilon_{bl} = \epsilon_{wh}$
average wage	2.19	2.07	2.19	2.22	2.21
unemp rate	6.60%	9.62%	6.67%	6.64%	6.60%
K/Y	12.76	12.65	12.75	12.74	12.98
Y	3.28	3.16	3.28	3.32	3.30
Average welfare gain (%)					
Average		−8.86	−2.17	−1.31	−1.26
Black		2.59	0.46	3.26	5.32
White		−11.56	−2.79	−2.39	−2.82

In Column 3, we raise black workers' bargaining power ξ_{bl} to the same level as white workers at 0.1584. The impact on aggregate outcomes is negligible. However, the economy experiences a 2% drop in average welfare, led by a 2.8% decline in white worker's welfare. Black workers have a moderate (0.5%) increase in welfare.

In Column 4, we further equalize the AR(1) processes between black and white workers,

in addition to equalized bargaining power. Though standard models view AR(1) as idiosyncratic productivity carried with a worker, we model it here as non-market factors that disturb a worker's daily job function. Based on calibration, black workers experience less persistence in job performance and more unexpected circumstances. These can be unobserved factors, such as health, neighborhood, family, police, and so on, that impose spillover effects on their labor market performances. Compared to Column 3, equalizing the AR(1) processes generates higher average wages and output and negligible effects on other outcomes. Though still a moderate average welfare loss (1.3%) compared to the benchmark model, it has a higher average welfare than Column (3), especially for black workers.

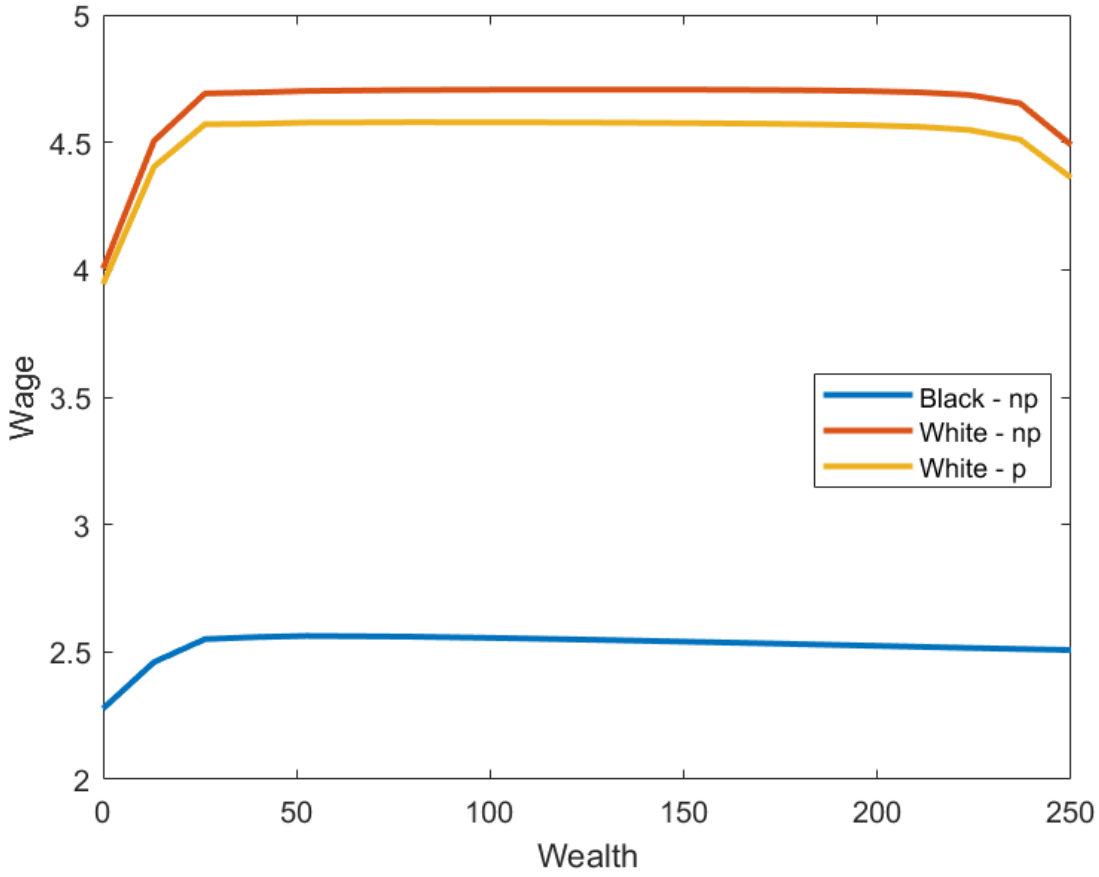
Lastly, we assign black workers the same extreme wealth destruction shock as white workers in Column (5) of Table 2. Our calibration shows that black workers experience about twice the likelihood of losing their wealth compared to white workers. This corresponds to Derenoncourt et al. (2023), which cites various historical factors that destruct wealth accumulations for black households in the US and the continuity of their impacts in the post-Civil Rights Movement Era after the 1970s. Just equalizing wealth conditions strongly raises black worker welfare to 5% higher than the benchmark economy. It has a rather similar effect as Column (4), where we equalize both bargaining power and AR(1).

Overall, we show that removing discrimination improves black workers' welfare. Removing non-market discrimination may also raise aggregate output. Yet, it is not a Pareto Improvement. In the next section, we explore the mechanisms of how different discriminatory factors perturb the economy.

5 Mechanism

In this section, we explore the mechanisms by which various sources of racial discrimination affect the entire economy. We start by examining the mechanisms of market discrimination and then the various types of non-market discrimination.

Figure 3: High-productivity wage



5.1 Making market discrimination costly

In our model, the prejudiced firm only hires white workers and completely discriminates against black workers. Prejudiced firms have a lower market tightness (θ_p) compared to non-prejudiced firms (θ_{np}). Therefore, they have a lower chance of matching with a worker $q(theta_p)$. Moreover, according to our benchmark calibration, prejudiced firms have higher vacancy posting costs (8.4) than non-prejudiced firms (2.3), yet still have to compete against non-prejudiced firms to hire. As a result, Figure 3 shows that prejudiced firms offer a lower wage than non-prejudiced firms for white workers.

Following Table 2, we raise κ_p to 3000 compared to the benchmark value 8.4. Table 3 presents the effects. Raising vacancy posting cost κ_p directly reduces the presence of prej-

udiced firms in the economy. This exercise nearly eliminates prejudiced firms from the economy, with a market tightness of 0.00008. As a result, white workers now have nearly the same job finding opportunity as black workers (0.57), and the unemployment rate equalizes between the two races (10%). However, compared to the Benchmark level, white workers have a much lower job-finding rate and a nearly-doubled unemployment rate. This is because high κ_p drives away an entire production sector that was exclusively available for white workers. Given the relative competitiveness between the two sectors, the prejudiced sector picks up primarily displaced white workers from non-prejudiced sectors. Eliminating the prejudiced sector removes this job opportunity for white workers. As a result, their welfare drops by 11% as in Column 2 of Table 2.

Table 3: Making discrimination costly

Moments	Benchmark	High κ_p
Labour Market		
np market tightness	0.84	1.29
p market tightness	0.25	0.00008
job finding rate (Black)	0.495	0.57
job finding rate (White)	0.66	0.58
Unemp rate (Black)	0.12	0.101
Unemp rate (White)	0.054	0.095
Income		
Mean wage ratio	0.75	0.87
Wealth		
Mean wealth ratio	0.23	0.27
Median wealth ratio	0.36	0.36
Share of zero wealth (Black)	0.13	0.12
Share of zero wealth (White)	0.06	0.07

Without competition from prejudiced firms, non-prejudiced firms can retain more matched workers with relatively lower wage offers. This relaxes the non-prejudiced labor market and raises market tightness to 1.29 from the benchmark of 0.84. This also explains the decline of the average wage level in Column 2 of Table 2, further depressing white workers' average welfare. However, given more firms entering the non-prejudiced market, it also adds significantly more job opportunities for black workers, hence the increases in their average

welfare.

Moreover, as non-prejudiced firms no longer compete against prejudiced firms to offer white workers a higher wage, the racial wage ratio increased from 75% to 87%. We can infer that the remaining 13% of the wage gap derives from non-market discrimination. Reducing racial wage and employment gaps also translates into a moderate reduction of the average racial wealth gap. The median wealth ratio stays unchanged.

5.2 Removing non-market discrimination

Our search-and-matching framework directly models discriminatory hiring in the labor market. However, numerous empirical efforts describe the various sources of cultural, historical, political, and social factors outside of the labor market impacting a worker's observed labor market outcomes, as summarized by Spriggs (2020) and Small and Pager (2020). We summarize various non-market factors into disparate bargaining powers, idiosyncratic productive AR(1) processes, and extreme shock to wealth. Table 4 presents the channels of how non-market factors translate into aggregate outcomes in Table 2.

Bargaining power: Column 2 of Table 4 presents the impact of removing bargaining power disparity. We start by assigning black workers the same bargaining power as white workers, from 0.1561 to 0.1853, while keeping the rest of the model as the Benchmark setting. With higher bargaining power, black workers are able to bargain for a higher wage, hence directly increasing the black-to-white mean wage ratio from 75% to 78%. Higher wages for employed black workers also translate to higher average wealth. The mean wealth ratio increases by one percentage point. This translates into a 0.5% increase in average welfare gain for black workers.

However, compared to the benchmark, it also reduces the retained profit once a non-prejudiced firm meets with a black worker. As a result, vacancy postings in the non-prejudiced market decline, and non-prejudiced market tightness reduces from 0.84 to 0.77.

This also reduces the probability of white workers finding jobs in the non-prejudiced market. In response, the prejudiced market gains relative competitiveness and posts more vacancies. The prejudiced market tightness increases. Given the relatively minor scale of change in the bargaining power, aggregate outcomes remain relatively unchanged in Column 3 of Table 2. Yet, the decline in non-prejudiced market vacancy posting translates into a 2.8% decline in average welfare for white workers.

Table 4: Removing non-market discrimination

	Benchmark	$\xi_{bl} = \xi_{wh}$	ξ and $AR(1)$	$\epsilon_{bl} = \epsilon_{wh}$
Labour Market				
np market tightness	0.84	0.77	0.80	0.79
p market tightness	0.25	0.26	0.25	0.26
Unemp rate (Black)	0.12	0.12	0.12	0.12
Unemp rate (White)	0.05	0.05	0.05	0.05
Income				
Mean wage ratio	0.75	0.78	0.84	0.77
Wealth				
Mean wealth ratio	0.23	0.24	0.27	0.67
Median wealth ratio	0.36	0.36	0.36	0.82

Idiosyncratic productivity: Column 3 of Table 4 presents the impact of removing idiosyncratic productivity disparity. We assign black workers the same AR(1) processes as white workers. This increases black workers' productivity persistence and reduces the volatility. Intuitively, it increases the stability of the performance of the worker and raises the expected continuation value of the worker for the firm. As a result, compared to Column (2), the non-prejudiced sector has a higher labor market tightness from 0.77 to 0.8 because of the increased vacancy postings from non-prejudiced firms, benefiting both black and white workers. Effectively, more non-prejudiced firms crowd out prejudiced firms, reducing their market tightness from 0.26 to 0.25. More persistent idiosyncratic productivity also translates to higher bargained wages for black workers. Compared to Column (2), the mean wage ratio further increases from 77% to 84%. It translates to a higher mean wealth ratio of 27%, the

same as removing prejudiced firms. This explains the increase of black worker welfare in Column 4 of Table 2 from 0.46% to 3.26% from Column 3 and the increase of white worker welfare from -2.17% to -1.31%.

Wealth shock: Column 4 of Table 4 presents the impact of removing wealth shock disparity. We assign black workers the same probability of losing their wealth as white workers, from 0.0212 to 0.0112, and keep the rest of the model at the Benchmark setting. This parameter drives the wealth disparity between black and white workers. Equalizing the chances of accumulating wealth directly increases the black-to-white mean wealth ratio from 23% to 67% and the median wealth ratio from 36% to 82%. We can infer that the remaining wealth gap comes from labor market disparities.

The remainder of the effects from equalizing wealth shock resemble the impacts of equalizing bargaining power, theoretically and quantitatively. Following **?**, individuals self-insure labor market conditions using private wealth. A more stable chance of accumulating wealth allows black workers to self-insure against unemployment and negative AR(1) shocks. As a result, black workers have stronger effective bargaining for higher wages. Quantitatively, it leads to the strongest increase of average welfare for black workers, 5.3%, as in Column 5 of Table 2.

In summary, we explore the mechanisms of market and non-market discrimination creating general equilibrium effects on the macro economy. Though discrimination reduces black worker welfare, the channel of impact differs. Discriminatory firms crowd out non-discriminatory firms, which reduces job opportunities for black workers. As an additional sector of employment opportunities for white workers, it also assists white workers to bargain for a higher wage, further exacerbating racial pay gaps. Non-market discrimination depresses black workers' competitiveness in the labor market. Lower bargaining power and less stability in wealth accumulation contribute to a lower wage and a lower chance of self-insuring against labor market adversity.

5.3 Heterogeneous welfare

We further decompose the welfare change by removing various forms of discrimination. We examine the heterogeneity by productivity types and by wealth quintiles.

Productivity types Table 5 presents the heterogeneous welfare change between black and white workers by productivity types. Though the welfare reduction of eliminating prejudiced firms is similar and large across productivities for white workers, the largest loss is for the lowest productive workers. This corresponds to the mechanism that the prejudiced sector provides alternative job sources for displaced white workers from non-prejudiced sectors. Prejudiced firms are likely to offer a more competitive wage to low-productive white workers. In reverse, highly productive black workers have the most welfare gain. Equalizing bargaining power has uniform impacts on welfare change across productivity types. The highest welfare gain for black workers after further equalizing AR(1) processes and equalizing wealth shocks, however, also goes to high-productive black workers. The strongest welfare loss under these two scenarios goes to the high-productive white workers.

Table 5: Heterogeneous welfare by productivity

Average welfare gain (%)	$\kappa_p = 3000$	$\xi_{bl} = \xi_{wh}$	ξ and $AR(1)$	$\epsilon_{bl} = \epsilon_{wh}$
Black	2.59	0.46	3.26	5.32
Black low P	2.56	0.45	2.99	5.27
Black mid P	2.59	0.46	3.25	5.32
Black high P	2.61	0.46	3.54	5.39
White	-11.56	-2.79	-2.39	-2.82
White low P	-11.57	-2.79	-2.38	-2.81
White mid P	-11.56	-2.79	-2.39	-2.81
White high P	-11.55	-2.79	-2.39	-2.83

Wealth quintiles Table 6 presents the heterogeneous welfare change by wealth quintiles between black and white workers. Acknowledging the wealth distribution changes in different general equilibrium, we look at the welfare changes based on benchmark quintiles. Removing discrimination from all sources benefits middle quintile black workers the most. In particular,

equalizing wealth shocks raises average welfare by 7.76% for middle-quintile black workers.

However, for white workers, removing all labor market-related discrimination factors (Columns 1-3) reduces the welfare of middle quintile black workers the most. After eliminating prejudiced firms, the largest reduction (14%) happens to middle quintile white workers. Equalizing wealth shocks, however, reduces the welfare of the highest quintile white worker the most, by 2.8%.

Table 6: Heterogeneous welfare by wealth

Average welfare gain (%)	$\kappa_p = 3000$	$\xi_{bl} = \xi_{wh}$	ξ and $AR(1)$	$\epsilon_{bl} = \epsilon_{wh}$
Black				
low 20%	2.58	0.46	3.20	5.28
40-60%	3.74	0.65	4.81	7.76
top 20%	2.58	0.44	3.42	5.68
White				
low 20%	-11.62	-2.79	-2.38	-0.23
40-60%	-14.34	-3.45	-2.95	-1.29
top 20%	-11.48	-2.79	-2.39	-2.84

6 Policy implications

6.1 Unemployment Insurance

With the understanding that racial discrimination creates disparities between black and white workers, we further document the disparate impact of aggregate policies. In this section, we show the impact of Unemployment Insurance across the three dimensions: replacement rate (h), eligibility probability (Pe), and max payout (χ).

In the benchmark, we have the replacement rate as 40%, eligibility probability at 26 weeks, and maximum payout as 48% of the median wage. We vary each dimension by adjusting it to 10% and 20% above and below the benchmark level and examine the change in the unemployment rate gap, average black-to-white wage ratio, and wealth ratio. We further change the funding of UI from benchmark labor income tax to capital gain tax, and

report the effects.

Figure 4: UI and racial wage gap

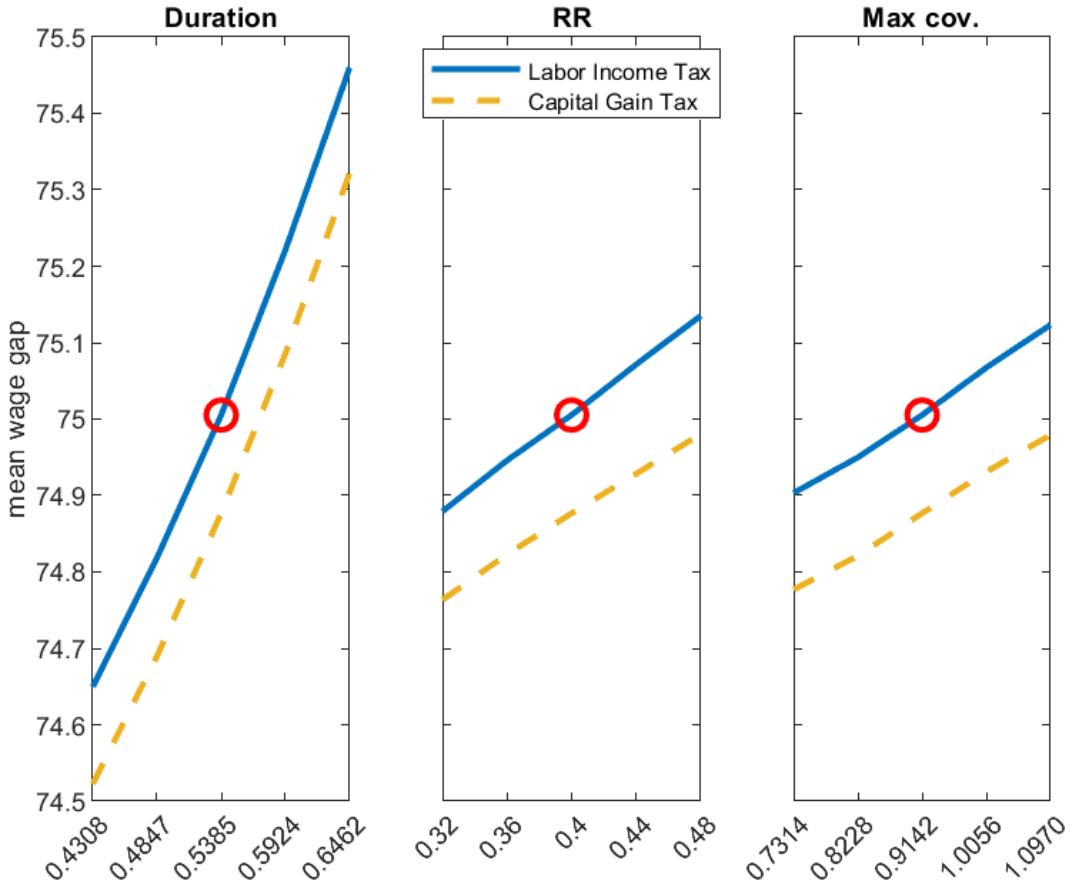
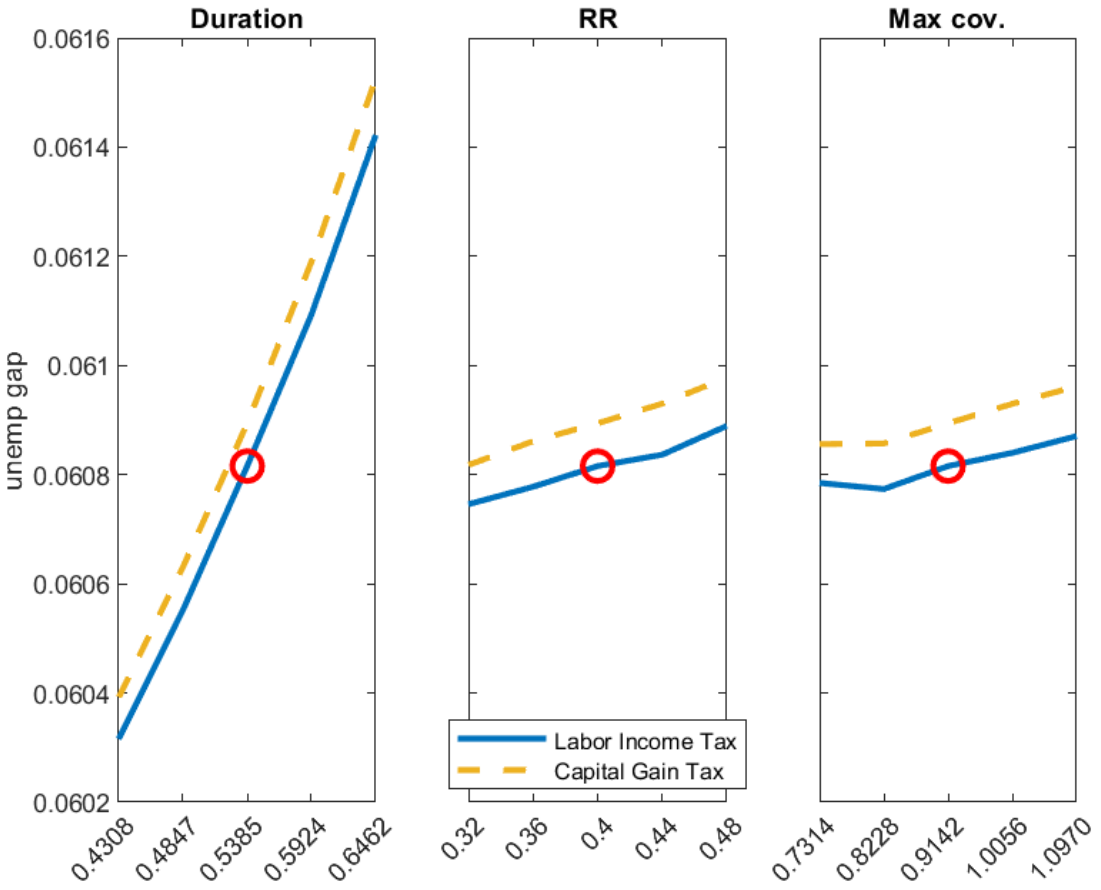


Figure 4 plots the effects of varying UI on the average racial wage ratio. Overall, increasing duration, replacement ratio, and maximum coverage monotonically increase the average black-to-white wage ratio, reducing the racial wage gap. In comparison, funding the UI with labor income tax has a more positive impact on reducing the racial wage gap than through capital gain tax. Following the mechanism discussed, UI provides public insurance for individuals. For black workers experiencing a worse wealth accumulation process, more expansive UI provides alleviation for lack of self-insurance. This allows black workers to bargain for better wage outcomes.

Figure 5 plots the effects of UI on the unemployment rate gap. Raising UI on each

Figure 5: UI on Unemp Rate Gap



dimension, however, increases the racial unemployment rate gap. Following the mechanism of insurance, as black workers bargain for higher wages with more expansive UI coverage, it also reduces the vacancy posting for non-prejudiced firms. The effect on the prejudiced sector is less, as it is a buffer for white workers. As a result, the unemployment gap increases as UI expands.

Figure 6: UI on Wealth Gap

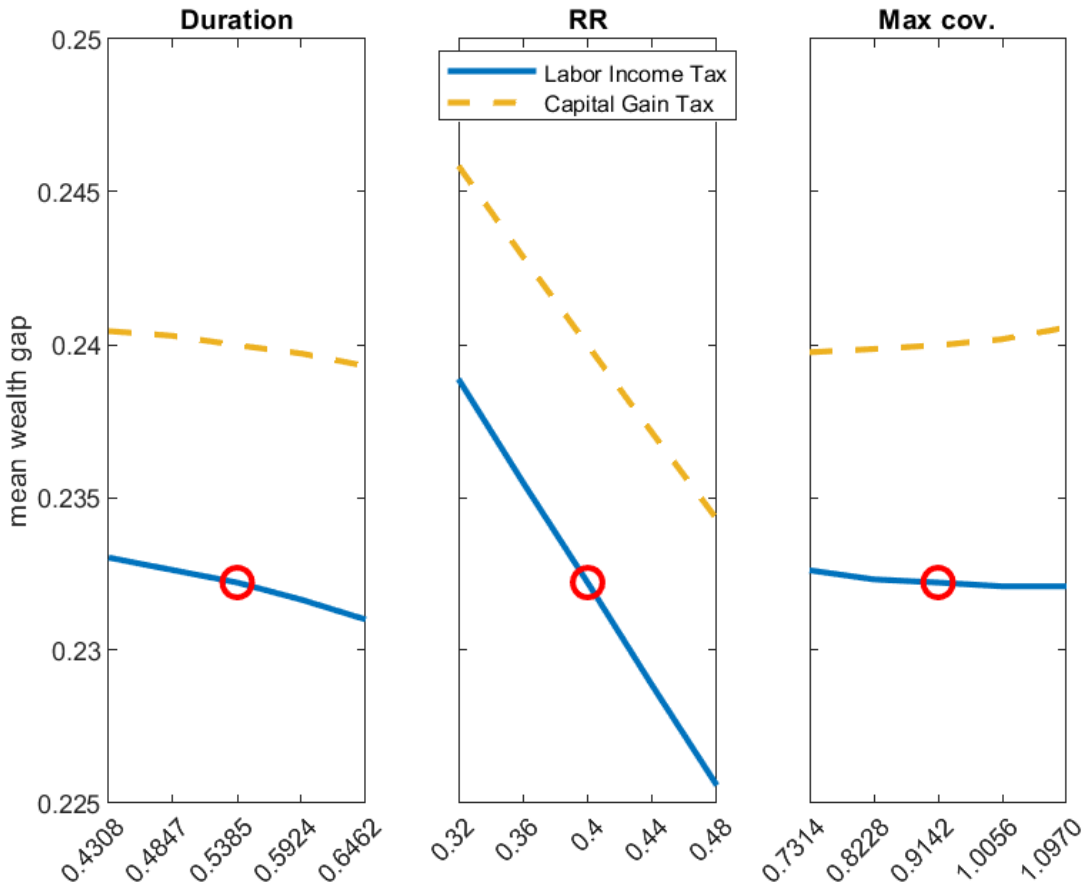


Figure 6 plots the effects of UI on ratio wealth. Raising UI on each dimension also depresses the racial wealth gap. Though black workers can bargain for higher wages with more UI, the unemployment rate increases dominate the outcome in translating the labor market conditions to wealth accumulation. As a result, the wealth gap increases. Interestingly, funding UI with capital gain tax reduces the wealth gap. This is because of the large wealth

inequality between black and white workers. A capital gain tax provides more redistribution of wealth than a labor income tax.

7 Conclusion

This study examines the effects of racial discrimination within a frictional labor market on employment, wage disparities, and wealth accumulation between Black and White workers in the U.S. We develop a search-and-matching model that incorporates firms with and without racial prejudices, alongside race-specific pathways for wealth accumulation. Our findings reveal that racial discrimination in hiring and production processes significantly exacerbates wage gaps, particularly among highly productive workers. Moreover, discriminatory practices disproportionately consign Black workers to the lower end of the wealth spectrum. Contrary to conventional discrimination theories, our analysis suggests that discriminatory hiring practices persist as an equilibrium outcome within frictional markets. Eliminating these discriminatory factors paradoxically results in a decrease in overall welfare, as prejudiced firms inadvertently bolster leverage for White workers and contribute additional economic output, albeit at the expense of Black workers. Furthermore, non-market discrimination – manifested through unequal bargaining power, biased production processes, and disparate wealth shocks – while diminishing overall output, disproportionately hinders Black workers' participation in the labor market. Equalizing these non-market factors, therefore, also diminishes welfare advantages for White workers. Importantly, our study identifies a pronounced spillover effect of labor market discrimination on wealth accumulation, with a notable, albeit weaker, influence of wealth disparities on negotiated wages. Our findings shed light on the enduring nature of Black-White racial disparities in the U.S., offering insights into the complex interplay between discrimination, labor market dynamics, and wealth accumulation.

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