

Human Capital or Discrimination: Addressing Income, Employment, and Wealth Gaps Between Black and White Americans.

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Laatija:
Aava Vuojärvi

Ohjaaja:
Prof. Heikki Kauppi

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Oppiaine: Taloustiede

Tekijä: Aava Vuojärvi

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Abstract

This master thesis examines what factors have contributed to the gap in income, employment, and wealth between White and Black Americans. The study reviews the literature on the Black-White gaps in human capital accumulation and the evolution of discrimination models from the late 1950s to the 21st century. It then investigates racial disparities within institutional frameworks, providing examples from financial, governmental, and health institutions as they show potential for structural racial bias. Lastly, the study explores the effectiveness of minimum wages, credit market expansion, and education design as examples of policies to reduce discrimination and human capital accumulation differences as well as the potential of algorithmic decision-making to reduce racial bias in economic outcomes.

Avainsanat: economic inequality, United States, race, discrimination, human capital, institutions

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1 Introduction

Despite significant progress over the last 60 years, the economic gap between Black and White people remains a prominent feature of the American landscape. Currently, only eight of the 500 largest corporations are led by Black CEOs. The publisher of the Fortune 500 remarked: “Black CEO representation . . . is so bad this year’s 1.6% is a near-record high.”. At a national level, while Black people form 12.1% of the U.S. population, 19.5% live in poverty. In contrast, White Americans, who constitute 57.8% of the population, experience a poverty rate of only 8.2% (Census 2020). This disparity is evident in national data on income, employment, and wealth.

Researchers have widely investigated the reason behind these racial disparities. Empirical studies highlight factors such as occupation, education, skills, socioeconomic background, and historical disadvantages (Smith and Welch, 1989; Card and Krueger, 1992; Neal and Johnson, 1996; Neal, 2005; Hsieh et al., 2019; Lipton, 2022; Derenoncourt et al., 2023). Additionally, discrimination models attribute these gaps to employers’ perceptions of minorities, molded by prejudice (Becker 1957; Charles and Guryan, 2008), stereotypes (Arrow, 1972; Phelps, 1972), and unconscious bias (Bertrand, 2005). Others argue that broader economic frictions may be responsible for the barriers Black people face to accumulate education, experience, and skill, or shortly human capital.

Understanding racial economic inequality is not straightforward when various factors overlap. Moreover, not all Black people experience similar economic inequality relative to White people (Neal, 2005; Hurst et al., 2021). Disparities vary by gender (William and Rodgers, 2016) and are influenced by policy including aid programs (Rothstein and Nichols, 2015; Derenoncourt and Montialoux, 2023) and market regulation (Chatterij and Seamans, 2012). As economic outcomes are sensitive to other issues than race, it is often hard to isolate what part of the gap is due to racial inequality.

Studying race and economic inequality raises the question of how race is interpreted. Many researchers perceive race as a social construct (Francis et al., 2022), belonging to societal systems, norms, and practices (Bayer, 2016) and argue it should not be studied as an independent variable alongside education or occupation. Because the reading of race influences how scholars determine the causes of racial inequality and the appropriate policy responses, the interpretation of race in the context of economic inequality is nuanced.

These are the broad themes and challenges that this master thesis aims to address. More precisely, this master thesis will focus on three questions:

(1) How does racial inequality in the United States reflect in the Black-White gap in wage/income, employment, and wealth and how has this changed over time?

(2) To what extent have the different factors been found to affect the Black-White gap in economic outcomes?

(3) What policies can encourage convergence in income, employment, wealth, and human capital accumulation between Black and White people?

To answer this question, I will first study the evolution of Black-White economic gaps over the last 60 years. Using the results from various, contrasting studies and data from sources such as the Bureau of Labor Statistics, I outline the historical and contemporary trends in the three economic outcomes of interest. I find that while Black people have achieved higher levels of income, employment, and wealth, the White-Black gap has persisted across all three measures. Additionally, there are significant differences by gender, skill, and the gaps have varied over time.

Secondly, this thesis will review the literature on human capital accumulation and discrimination. I make three contributions. Based on the literature, I find investment in education is an important channel to reduce Black-White economic gaps, but Black socioeconomic mobility may be constrained by underlying wealth disparities, regional differences in historical discrimination, and unobserved differences in school environments. Second, the change in discrimination models indicates that scholars have gradually moved to study more subtle forms of discrimination. Discrimination is no longer explicit but rather implicit. Third, it has proven hard to find explicit evidence for widespread institutional discrimination, although studies on diverse topics such as lending and court sentencing provide suggestive evidence that institutional practices can create racial disparities that influence economic outcomes.

Thirdly, I explore recent studies on policies, ranging from education designs to new algorithmic solutions, that have been found to reduce racial economic gaps. I discuss the positive effects of policies to support competitive lending markets, and fair labour compensation, as well as to increase access to higher education and subsidize high-return college can have on economic opportunity. I reflect on how these correspond to the earlier findings on trends in economic outcomes, human capital accumulation, and discrimination. Lastly, I synthesize the framework for dealing with the challenges of using a new, unfamiliar tool — algorithmic debiasing — to reduce racial inequality in economic decision-making.

The rest of the paper is structured as follows: Chapter 1 reviews the trends in the Black–White income/wage, employment and wealth gaps from the Civil Rights Era to today. Chapter 2 synthesizes literature on the determinants of racial inequity. Chapter 3 reviews minimum wage, credit market expansion, and education design as examples of remedying policy. Chapter 4 discusses algorithmic de-biasing as a potential future policy to reduce bias and economic disparities. Chapter 5 concludes the study.

2 Trends in wages, income, wealth and employment

The income, wealth, and employment gaps between Black and White Americans have persisted since the 1960s. Between the 1960s and 1970s, there was a notable trend of growth and convergence for Black individuals toward White levels of wealth and income, followed by a divergence starting in the 1980s. This pattern is evident among both Black men and women. However, within-population variation in the outcomes indicates that the broader trends were more often the combination of shifts for specific subgroups rather than uniform ascents or declines.

Wages and income

Over the last decades, the overall wage trend has been positive for Black Americans. Hsieh et al. (2019) estimate that over the past 50 years, real wages increased by around 60% for Black women and around 45% for Black men. They suggest that the barriers to occupational choice, relative ability across occupations, and relative returns to occupational skills have changed, resulting in a convergence in occupational distribution between groups. As more people have moved to higher-paid occupations, the real wages have grown. Alas, this broad growing trend masks significant temporal and gender-based heterogeneity as well as a persistent Black-White wage gap.

The 1960s and 1970s were a period of remarkable convergence. In 1960 Black men were earning 58% of what White men earned; by 1970, the figure stood at 72% (Marwell, 2009). Reasons for the reduction in income inequality are many. First, the passage of the 1964 Civil Rights Act likely drove an occupational shift in Black workers towards more lucrative sectors in response to reduced discrimination and improved opportunities in the labour market (Freeman et al., 1973; Blau and Beller, 1992; Conrad, 2001). For example, the number of Black

men working in the low-paid agriculture, forestry, and fishery sectors more than halved (27% to 12%) during the 1960s as Black men were increasingly employed in other industries such as transportation and manufacturing (Marwell, 2009). Second, the wages across all these industries rose relatively more for Black men in the 1970s, thus reducing the income gap (Marwell, 2009). For women, the story is similar. During the 1970s, private household work ceased to be a major employer of Black women, and this shift alone has been estimated to account for 87.4% of the reduction in the wage gap between 1971 and 1981 (Blau and Beller, 1992). Moreover, increases in education and the relative improvements in school quality may have facilitated the convergence in income during the 1960s and 1970s; however, the studies have only included statistics on men (Card and Krueger, 1992; Heckman et al., 2000).

In the 1980s, the Black-White wage gap for men began to expand. Bound and Freeman (1992) argue that the racial income gap grew particularly for two subgroups of new male market entrants. First, in response to a growing supply of Black college graduates, the income gap between Black and White male college-educated men increased. Second, the fall in the real minimum wage, the drop in union density, and the loss of manufacturing jobs resulted in the widening of the Black-White income gap among high school or less educated Black men in the Midwest. Overall, there is a wide consensus that the change during the 1980s was negative (Wilson and Rodgers, 2016; Hinton, 2016; Bayer and Charles, 2018).

The 1990s were another decade of moderate convergence. Couch and Daly (2002) estimate that the racial wage gap for men declined by 0.59% year. They suggest this was a broad trend that benefited all subgroups, particularly new market entrants who had moved away from industries and occupations with lower pay. Tightening labour markets and increases in the minimum wage may have also played a role (Wilson and Rodgers, 2016). Contrastingly, the Black-White wage gap for women decreased slightly during the 1990s (Wilson and Rodgers,

2016). Still, other economic indicators suggest the overall effects were positive for Black women. During this decade, Black women with no college education had higher rates of workforce participation relative to similar White women, and the fraction of Black women with a college education increased while the fraction of college-educated White women fell (Neal, 2005). Together, the trends suggest economic prospects improved during the 1990s for Black Americans .

Once more, during the first two decades of the 21st century, the Black-White income gap has grown. Bayer and Charles (2018) argue this began already in the 1980s. The authors estimate that between 1980 and 2013, the median income gap stalled at somewhere between 35-39%. Daly et al. (2017) estimate that in 2016, a Black male worker earned only 70% relative to his White counterpart. The authors find the gap is similar for women. Wilson and Rodgers (2016) suggest this trend relates to declining unionization, a growing racial gap in college completion, and labour market discrimination.

In recent years, the data shows the situation has not improved much. Between 2019 and 2022, the income of White families grew by 16.6% whereas the income of non-White families grew only by 6-7%. The growth of wages and salaries contributed 6.16 percentage points to a White family's income growth, whereas the contribution was negative for a Black family (-0.03%). During COVID-19, government transfer programs largely supported the income growth of Black families, rising from 1.1% in 2019 to 17% by 2022. The newest data from the coronavirus pandemic is telling of significant income disparities between White and Black families as they relate to economic shocks. (Board of Governors of the Federal Reserve System, 2023)

Wealth

Important racial economic gaps are also present in the distribution of wealth in the United States. While the highest shares of wealth are owned by White and

Asian American families, the lowest are owned by Black and Hispanic families. The median wealth of a White family was over 285, 000 dollars, and that of an Asian American family was over 536,000 dollars, whereas the median wealth of a Black family was under 45,000 dollars and a Hispanic family's was just over 61,000 dollars. As of last year, Black families owned just 12% of the wealth of a typical White family. (Board of Governors of the Federal Reserve System, 2023).

In a wide-sweeping overview of the racial wealth gap, Derenoncourt et al. (2023) estimate the general trend between the 1960s and 1980s was one of convergence driven by income convergence and moderated by a slightly higher rate of saving for White people compared to Black people. Since the 1980s, the authors argue the Black-White gap in wealth has widened in mirror with the widening of the wage gap, and has not returned to a path of convergence. Bartscher et al. (2020) and Aladangady et al. (2023) suggest this is reflected by growing disparities in wealth concentration. White households, particularly wealthy households, have diversified their wealth across housing, liquid assets, business, and corporate equity, while the majority of Black households hold their wealth in housing. Though housing wealth has appreciated since 1950, the proportional appreciation of stock equity has been fivefold; and this has led to large increases in the wealthiest White households and contributes disproportionately to the estimate of wealth for the average White household (Derenoncourt et al., 2023).

On the other hand, simulated models of wealth transmission suggest the gap is related to differences in past wealth and perceptions of wealth. Firstly, Lipton (2022) argues that even if all discrimination had been abated by the end of the Jim Crow laws, the wealth gap would have persisted. Because White households' historical advantage in firm ownership resulted in a superior income-generating capacity than Black households, the inter-generational transfer of firm assets continues to act as an inter-generational transfer of income-generating capacity. Secondly, Boerma and Karabarbounis (2021) suggest a substantial role is played

by the history of exclusion that prevented Black households from participating in the labour and capital markets. Even if direct wealth transfer would presently be given to Black households, the weight of historical exclusion would cause them to uphold negative associations between risk and investment return, resulting in little change in investment returns for Black households. Thus, racial differences in historical wealth and perceptions of wealth may, according to researchers, be another reason why wealth gaps have persisted.

Employment and unemployment

For the last 50 years, the Black-White gap in employment has also held steady. The percentage of unemployed persons has constantly been the highest for Black people relative to White people. Between 1972 and 2024, the unemployment rate for Black workers varied principally between 7.5% and 17.5%. In the recent decade, it is possible to identify a decreasing trend: since 2016, the Black unemployment rate has fluctuated at a rate below 7.5%.(U.S. Bureau of Labour Statistics, 2024)

In the same period, White unemployment rates have fluctuated between 2.5% and 7.5% with rare post-recession periods where the unemployment rates have exceeded 7.5%: last in November 2009 during the Great Recession (9.2%) and in April 2020 (14.2%). The latter is a significant outlier: it is the only occasion in the last 50 years when unemployment reaches over 10% for White people. (U.S. Bureau of Labour Statistics, 2024)

Typically, unemployment exhibits cyclical trends and reaches a sharp peak post-recession, but relative to Whites, Black people are persistently more affected by recessions. In the last 50 years, the peak unemployment rate for Black people was 21.2% in April 1983. The more recent peaks in unemployment rates have been below the 20% threshold, but only slightly. After the Great Recession in January 2010, the percent of unemployed Black workers was 17.3%, and during

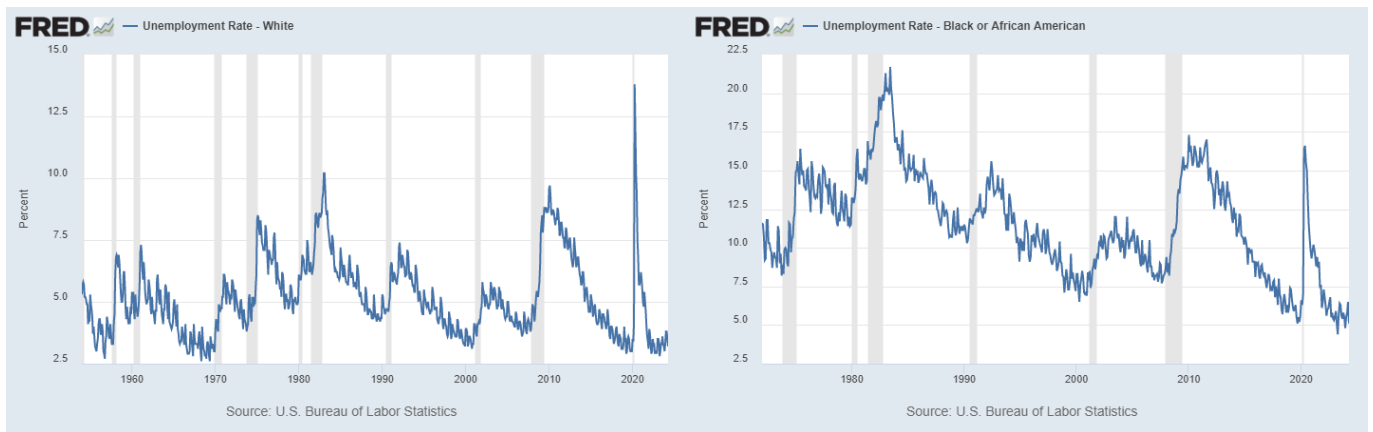


Figure 1: Unemployment for White and Black or African Americans

COVID-19 in May 2020, the unemployment rate was up to 16.6%. (U.S. Bureau of Labour Statistics, 2024)

Although the overall trend in unemployment has been decreasing, the reported unemployment gap has stayed constant since 1954. In 1989, Black men experienced unemployment rates 2.6 times the unemployment rate of White men, and Black women experienced rates 2.4 times those of White women. In September 2019, Black men and women were employed at roughly half the rate as their White counterparts, all while there was a historic low in unemployment. (Ford, 2023)

In the case of men, this has been linked to concurrent trends in labour force participation and incarceration rates that have been particularly devastating for low-income Black men. For White and Black men alike, the rates for labour market non-participation doubled between 1960 and 2010, but by 2010, the share of non-participation was twice as large for black men (37.8% vs 18.6%) (Bayer and Charles, 2018). Moreover, a policy shift between the late 1970s and 1980s saw a boom in incarcerations, which affected Black communities more severely than White communities (Neal and Rick, 2014; Hinton, 2016). The vast majority of these studies suggest the increases in rates of incarceration and labour market non-participation have been most pronounced for less skilled

Black men, who have lost considerable ground in comparison to their White counterparts.

A similar explanation cannot be given for the employment gap between White and Black women. Black women of all age groups have had one of the highest labour force participation rates throughout the second half of the 20th century and into the 21st century (Fullerton, 1999; Toossi and Morisi, 2017). The broad trend among all groups of women has been that of increasing participation. The reasons for this are manifold. Innovations related to contraception (Goldin and Katz, 2000; Bertrand et al., 2010) and higher divorce rates (Fernandez and Wong, 2014) have been associated with increased employment and, in some cases, educational attainment. Expanding government aid programs helped increase employment for low-skilled women (Schanzenbach and Strain, 2020). While these cannot explain the Black-White gap in employment for women, they suggest the underlying causes for the gap in employment between White and Black women and men are unlike.

The broad trend of the past half-century indicates that economic prospects have improved for Black people as real wages and wealth have grown and unemployment rates have sunk. Yet, the Black-White gap in employment, wealth, and income is still significant for both women and men. Moreover, the broad trends mask ongoing heterogeneity. As we have seen, a myriad of factors, including education, returns to skill, gender, and shifts in the economy and public policy, are involved in shaping trends in economic outcomes.

3 Barriers to economic equality

In this section, I will concentrate on the sources of economic inequality. I begin by briefly summarizing the literature on factors that may form barriers to human capital accumulation, weakening the relative employment opportunities, and dilating the lower end of the distribution of wages for Black people. I then review

the role of discriminatory firms and the evolution of the literature on discrimination models. While the models provide meaningful insight, it requires substantial evidence to conclude inequality is a consequence of discrimination. The chapter ends with a discussion on structural racial bias and whether institutional constructs could uphold racial economic inequality.

3.1 Human capital accumulation

Income and employment outcomes are associated with occupation. In turn, occupation depends, to an extent, on accumulated human capital, which comes with education and experience. For Black people and other minorities, barriers to accumulating human capital have been related to monetary costs, differences in school quality, lack of role models, historical restrictions, and differences in generational wealth (Hsieh et al., 2019).

Studies on human capital accumulation and racial economic discrepancies have used observational and experimental data to evaluate their economic impact. The former method struggles to singularly identify a causal effect of education or experience on primary outcomes, such as wages, as it is almost impossible to rule out what unmeasured characteristics may also explain group-level differences in economic outcomes. Thus, many researchers opt for controlled laboratory or field experiments on intermediary economic outcomes, such as hiring or admissions, where the group-level characteristics can be made known. The only drawback is that the results only reflect labour market outcomes indirectly, and thus, require more robust evidence to be shown to relate to wages or employment. (Heckman, 1998)

First, racial wage disparities have been traced back to the monetary costs of a college education. A survey on the US adult population (Lumina, 2024) found that a higher percentage of African American and Hispanic adults relative to

White and Asian American adults thought the most important barrier to obtaining a degree was the cost of higher school education. Compared to White and Asian American adults, African American and Hispanic adults viewed access to affordable quality education after high school for all citizens at the lowest rate. The figures, however, were not dramatically different.

Many studies report the short- and long-term benefits of increasing financial aid for low-income students. In a literature review, Deming and Dynarski (2009) find transparent aid programs for poor students may increase enrollment and persistence in educational advancement. Castleman and Long (2016) argue marginal increases in need-based aid have a positive impact on college outcomes for students with higher-than-average GPAs. The effects seem to be driven by the reduction in the monetary cost of obtaining a 4-year degree. Denning et al. (2009) show that Pell Grant aids that target low-income students have the largest welfare gains. For Black men, the receiving an Bachelor's degree has a significant equalizing effect on income, although part of this effect is diluted by lesser college completion rates for Black students relative to White students (Zhou et al., 2023). These studies show that lowering the cost of tertiary education may positively impact not only college attendance for low-income students but also be an equalizing economic force between Black and White people.

Further research suggests racial disparities in economic outcomes correlate with academic performance. Black-White gaps in school test scores have been related to racial differences in college attendance and income (Chetty et al., 2014). The convergence of the Black-White income gap has been associated with better education and schooling (Smith and Welch, 1986; Card and Krueger, 1992; Collins and Margo, 2003). The wider consensus on the role of school quality is less certain. While Deming et al. (2016) find no overall impact of school accountability for quality on the later attainment or income of the students, others find that high-quality teachers significantly increase expected income (Chetty et

al., 2014) and accountability pressures may reduce Black-White achievement gaps efficiently (Gaddis and Lauen, 2014).

The idea that education matters is not a new one. A higher degree eases the transition to more certain, higher-paid occupations. As a consequence, policy to aid the financing of college is a straightforward way to remedy Black-White income and employment gaps. Yet, when it comes to primary and secondary education, the research has no ready answer whether higher quality school alone help. Studying educational achievement among young adults makes for a difficult research topic because schools are a part of an environment where individual aspirations, support networks, parenting norms, neighborhoods and economic realities vary (Francis et al., 2022) . Still schools are the main passageway for children to young adults and lacking investment in black children can leave a significant Black-White skill gaps (Neal, 2005).

These issues have inspired studies with a unique perspective. Fairlie et al. (2014) argue the lack of role models may be important to why minority students underachieve. They find students at a large community college benefit from being taught by an individual of the same ethnic or racial group. Class dropout rates and academic performance of minority students fell when the course was taught by an underrepresented minority member compared to when it was taught by a White instructor. Similarly, Diette et al. (2021) find racial composition influences outcomes for Black students, who tend to do better at predominantly Black schools. Overall, it is not clear whether this is due to improved teacher-student relations, or having someone with shared experiences to look up to, but it does seem the race and ethnicity of educators positively influence the outcomes for racial and minority students.

On another note, Levine and Ritter (2023) suggest that wealth-based college financial aid systems may form implicit barriers for prospective minority students. The authors argue that wealth acts as an additional implicit subsidy worth

thousands of dollars for White college students with above-median income families relative to Black and Hispanic students of similar income-level families. This is because the amount of financial aid is tied to retirement savings and home equity which White families have higher shares of. They suggest the college financial aid system may explain as much as 10 to 15 percent of White students' advantage in college outcomes are tied to what seems like institutional practices. With lesser financial support from close relations, fear of debt, and lack of supportive knowledge, prospective ethnic and racial minority students may be less equipped for college.

Historical experiences may also matter for economic mobility. Derenoncourt (2022) studies the Great Migration (1940-1970) during which Black families relocated to the North and led the racial composition of the cities where they arrived to change. In the northern cities that received the highest numbers of Black migrants, she estimates the White flight, segregation, and reductions on educational spending were most marked. In these cities, the Migration reduced individual income rank for Black men with high- and low-income parents and increased the social mobility gap for Black children by over 20% compared to the case where they lived in other cities less affected by the Great Migration. Thus, historical events may locally affect the means of an entire Black generation to achieve prosperity.

Others too suggest that historical restrictions can influence regional differences in the economic gap between Black and White people. For instance, Williams (2021) studies local Black-White labour markets differentials using street names of prominent Confederate generals as a proxy for historical discriminatory policies. He finds that higher numbers of Confederate streets are associated with worse economic outcomes for Black people. In these areas, Black people tend to have lower wages and occupy lower-status jobs compared to White people. This suggests that, at a regional level, current economic disadvantage may echo America's segregated past.

This by no means is an exhaustive list of the studies on what barriers Black people may face in the United States in human capital accumulation. It highlights the importance of increasing educational opportunities. College financial aid for low-income students and investment in black children through measures like increasing the presence of relatable role models in school environments are examples of how barriers may decrease. However, the research also highlights the relevance of understanding the barriers historical discrimination, geography, and wealth disparities may create for socioeconomic mobility.

3.2 Discrimination in the labour market: the role of firms

For the past 60 years, significant effort have been made to understand how firms may discriminate and contribute to disparities in income and employment rates between Black and White individuals. To approach this issue, it's important to define two key terms. Discrimination is defined by Merriam-Webster as a "prejudiced or prejudicial outlook, action, or treatment," while prejudice is defined as either a "preconceived judgment or opinion" or "an adverse opinion or leaning formed without just grounds or before sufficient knowledge."

Discrimination is an act of prejudice, which exists as a mindset within individuals. Prejudice alone does not constitute discrimination; however, it can lead to unequal treatment in hiring or wage-setting. This suggests that if employers have negative views of race, they may engage in discriminatory behaviors. As a result, equally qualified and experienced Black and White workers may not receive equal pay or hiring opportunities.

Literature on economic racial discrimination focuses on employers, employees, customers, or coworkers who consciously treat Black workers differently to their White counterparts. Within the scope of this thesis, only employer discrimination will be discussed. The backbone of the literature (and the following

discussion) is made of two mid-21st century models: the taste-based discrimination model, which assumes employers are prejudiced, and the statistical discrimination model, which assumes they harbour negative stereotypes.

3.2.1 Taste-based discrimination

The mid-1960s mark the end of racial segregation in the United States. In 1964, the Civil Rights movement culminated in the 1964 Civil Rights Act which instituted federal protection from discrimination. Under Title VII it prohibited “discrimination . . . by employers, labor unions and employment agencies”. The end of segregation was met with significant civil rights protests and White resistance (Massey, 2011) which led, among others, to the death of Martin Luther King Jr., one of the most prominent leaders in the civil rights movement.

The model of taste-based discrimination was introduced as a part of a seminal paper titled *The Economics of Discrimination*, published almost a decade before the passing of the Civil Rights Act. Becker’s work was attuned to the contemporary political and social atmosphere in the U.S. He put forth an idea of economic discrimination driven by an aversion for cross-racial contact which was very real in the American society that Becker knew. In 1963 John F. Kennedy was still calling upon Congress for a legislative reform to give “all Americans the right to be served at facilities which are open to the public” and “to register and to vote in a free election” (Radio and Television Report to the American People on Civil Rights).

The later influence of Becker’s work, however, owes much to its pioneering work on the psychological determinants of economic behaviour. In the model, an employer, an employee, or a consumer can own a “taste for discrimination”, or shortly prejudice, that causes him to act as though he were ready to pay to be in contact with White people instead of Black people. The model was the first to consider prejudice as a non-monetary cost that economic agents considered

alongside other monetary costs. After, prejudice is modeled as a continuous variable that affects each employer's profit maximization program differently. The equilibrium Black-White wage gap reflects the level of prejudice that clears the labour market.

The model basics

The taste-based discrimination model assumes employers $i = 1, \dots, n$ are White and vary in their degree of prejudice, d . The production function $f(L_b + L_w)$ has constant returns to scale. White workers, L_w and Black workers, L_b are perfect substitutes in production.

Each employer aims to maximize his utility. Utility is given as the profit and the number of Black workers he employees with Black employees causing him the disutility $d_i \geq 0$ according to his level of prejudice.

$$\max_{\{L_b, L_w\}} \pi_i - d_i L_b.$$

where $\pi_i = f(L_w + L_b) - w_w L_w - w_b L_b$ is the employer's i profit and w_b, w_w are the wages he pays to Black and White workers, respectively.

Employers hire Black and White workers such that L_w^* and L_b^* fulfill the conditions of utility maximization:

$$\begin{aligned} f'(L_w^* + L_b^*) - w_w &\leq 0, \\ f'(L_w^* + L_b^*) - w_b - d_i &\leq 0,^1 \end{aligned}$$

Like in any utility maximization problem, the marginal cost of labour can never exceed the marginal product of labour. Whenever an employer hires a White worker, the marginal product must equal at least w_w . In the case of a Black worker, the marginal product must exceed the wage w_b as well as any disutility d_i .

This mechanism suggests discrimination distorts the pricing of the Black labour force to make it appear more costly for discriminatory employers who associate hiring a Black worker with higher disutility.

The pricing mechanism of the model implies Black workers go to work for the least discriminatory employers. The non-discriminatory employer hires exclusively from L_b if the marginal cost for Black workers is less than that of White workers $\pi_w > \pi_b + d_i$. The lack of prejudice makes the cost of hiring Black workers profitable. For her to hire White workers, the net cost of hiring Black workers would have had to rise until $\pi_w = \pi_b + d_i$. As a result, Black workers are sorted to the least discriminatory employers, and White workers are sorted to discriminatory employers.

The short-term equilibrium wages w_w^* and w_b^* that balance the labour market supply and demand are set by the employers that are indifferent to the race of the worker that they hire. Their level of discrimination determines the *the marginal discriminator coefficient*, d_i^* and sets the equilibrium wage gap.

$$w_w^* = w_b^* + d_i^*$$

The equilibrium wage gap implies the wage gap is determined by the distribution of tastes only among the least prejudiced employers. Their lower net costs from hiring Black workers suggest that they hire Black workers first. Thus, the variation in prejudice among those with $d_i > d_i^*$ does not affect equilibrium Black-White wage gap as long as the distribution of prejudice is fixed and/or the relative supply of White and Black workers does not change (for detailed discussion, see Becker 1957).

Legacy

The Economics of Discrimination established a foundational framework for re-

search on racial economic inequality. Essentially, Becker suggested that the level of discrimination in the labour market does not necessarily reflect the average discriminatory employer. Therefore, finding evidence of discriminatory employers does not equate to uncovering the overall level of market discrimination.

Becker's discovery still reflects an empirical challenge. Modern researchers struggle to quantify taste-based discrimination in wages because they lack a sound measure for the distribution of prejudice in a population. Many times, the validity of empirically measured levels of wage and hiring discrimination has been questioned on the premises of Becker's finding (Heckman, 1998; Charles and Guryan, 2013; Neumark, 2018).

Direct tests of Becker's predictions are practically inexistent, with the notable exception of Charles and Guryan's (2008) work. The authors use the General Social Survey data to construct a distribution of prejudice for non-Blacks in the US states and regress the wage differential on the distribution of prejudice and the relative size of the Black population within a state. The study estimates that taste-based discrimination accounts for one-fourth of the racial wage gap in the US and accumulates to a \$34,000 - \$115,000 discounted loss in annual income for Blacks depending on the state they lived in. This is an important gap, but it accounts for only a quarter of the wage differential.

These are not the only drawbacks: Becker's model cannot address racial disparities in unemployment and within-race heterogeneity in wage differentials (for a detailed discussion, see Lang and Lehmann, 2012). Many economists have attempted to address these limits. For example, search models (Black, 1995; Rosén, 1997; Lang et al., 2000; Bowlus and Eckstein, 2002) evolved to address prejudiced employers in combination with either unemployment gaps or within-race heterogeneity in wages, but none were capable of doing both.

Most recently, Hurst et al. (2021) argue that neutral changes in task prices

can affect the course of the racial wage gaps even when labour market discrimination and racial skill gaps remain constant over time; Black and White men generally sort into jobs with different task profiles. While this study gives a plausible alternative explanation for racial wage gaps and wage differentials even when discrimination holds steady, the full explanation eludes description. No discrimination model has yet managed the triple feat of addressing racial discrimination, within-race heterogeneity in wages, and racial gaps in employment simultaneously .

On another note, the literature suggests taste-based discrimination can be addressed in one of two ways. Either the cost of discrimination is increased or prejudice decreases. The cost of discrimination is, in its most concrete sense, the penalties a company pays for engaging in illegal employer practices. Kline et al. (2022), for example, find that federal contractors and firms that have faced more recent Department of Labor citations for wage and hour violations show more interest in minority job applicants, suggesting that the risk of losing contractor status or being further penalized increases adherence to anti-discrimination policy.

Lastly, empirical studies do not agree on whether prejudice has decreased and how this has affected wage gaps. On one hand, Hsieh et al. (2019) find evidence for the convergence of White and Black men's wages between 1960 and 2010, but estimate it has been largely driven by smaller barriers to human capital accumulation and marginally by a decline in discrimination as Becker described it. On the other hand, Hurst et al. (2021) document a 75% decrease in taste-based discrimination over the past sixty years but identify a significant wage gap driven by taste-based discrimination in jobs that require social interaction. Together, the results are puzzling, as it seems taste-based discrimination can play both a marginal and important role in wage gaps.

3.2.2 Statistical discrimination

In the 1970s, new statistical discrimination models questioned Becker's conception of employer discrimination. Phelps (1972), Arrow (1972), and Aigner and Cain (1977) were among the first to suggest racial gaps in wages, employment, and hiring were a consequence of informational asymmetries and uncertainty; both were inherent characteristics of the labour market. To determine who to hire and at what price, the researchers pointed out employers are required to predict the marginal productivity of workers based on interviews or test scores that are estimates at best.

The economists in support of the idea of statistical discrimination suggested indicators of marginal productivity have either less robust, more heterogeneous, or partially skewed information on minority abilities in comparison to non-minority abilities. Because of risk aversion or the tendency to overweight racially biased predictors, rational decision makers condition their choices on group membership, producing unequal outcomes for White and Black people (Arrow, 1972).

Over the next two decades, new statistical discrimination models adapted to growing demands to reduce racial equality. The following discussion mirrors the evolution of statistical discrimination models from the 1970s to the 1990s. In the late 1970s, Aigner and Cain (1977) argued hiring discrimination was the firm's efficient response to imperfect information and, therefore, a self-corrective mechanism of the market. Five years later, Lundberg and Startz (1983) argued that unequal compensation for workers with the same productive capacities is a form of inefficient allocation and should be corrected with race-blind restrictions on wage offers. A decade passed before Coate and Loury (1993) rebutted these claims. The authors argued economic discrimination may be a self-sustaining, negative dynamic between firms and minority workers and needed to be addressed through subsidies for minorities to increase human capital accumulation.

Looking at the three models intends to shed some light on how economists

have formally related employers' use of statistical inference to Black-White gaps in wages and hiring rates, as well as how these conceptions have evolved over time. Moreover, it helps elucidate why investing in human capital accumulation can improve economic outcomes for racial and ethnic minorities and why neutral decision-making tools might be significant for mitigating explicit racial bias.

Aigner and Cain (1977)

Aigner and Cain (1977) first formalised the intuition behind the early conception of statistical discrimination (Phelps 1972). They assumed that a test score y functions as a noisy proxy for marginal productivity, MP . In the simplified version, this equals:

$$y = MP + u$$

where $E(MP) = \alpha$, u is the error term, $E(u) = 0$ and $\text{var}(u) = \sigma^2$ and $\text{cov}(y, MP) = 0$.

When hiring a new worker, employers consider a test score, y , to signal the expected marginal productivity of the candidate. A test score may, however, be biased. The expected value of the marginal productivity conditional on a test score is:

$$\hat{MP} = E(MP|y) = (1 - \gamma)\alpha + \gamma y.$$

Here

$$\gamma = \frac{\text{var}(MP)}{\text{var}(MP) + \text{var}(u)}$$

γ corresponds to the "reliability" of a test score and measures how much of total variance in the test score is explained by variance in marginal productivity.

(Aigner and Cain, 1977)

In their work, Aigner and Cain's (1977) demonstrate the dynamic with two groups to show how statistical discrimination could produce an equilibrium wage gap. They assume there are two groups of workers, stars and diamonds, that have identical normal distributions of marginal productivity. A firm observes the test scores of both groups, yet the test scores indicate the marginal productivity for a worker from the star group more reliably than for a worker from the diamond group. This gives:

$$y_i^D = MP_i + u_i^D,$$

$$y_i^S = MP_i + u_i^S,$$

where $\sigma_{u^D}^2 > \sigma_{u^S}^2$.

Consistent with profit-maximizing behaviours, an employer pays a worker his expected marginal productivity based on the group- and individual-level information at hand:

$$w^S = (1 - \gamma^S)\alpha^S + \gamma^S y^S \tag{1}$$

$$w^D = (1 - \gamma^D)\alpha^D + \gamma^D y^D. \tag{2}$$

When firms consider the test score as a less accurate measure of a diamond workers' productivity than of a star workers', it is weighted less for a diamond applicant than for a star applicant ($\gamma^S \neq \gamma^D$). As a consequence, the wage scale of diamond workers $w^D(y_i^D)$ is characterised by a smaller gradient than the wage scale of star workers $w^W(y_i^W)$.

Ultimately, the mean wages will be identical for both groups, as they are equally productive on average. However, high-scoring diamond group members

will have lower expected wages than their counterparts in the star group. The reverse will apply to low-scoring diamond group members who will have higher expected wages than their counterparts in the star group.

Aigner and Cain (1977) suggested the equilibrium was not discriminatory, as equal productivity was being compensated by equal wages for both groups on average. Only a violation of this condition would constitute evidence for discrimination. In the counterfactual case where perfect information would be available, the firms would use unbiased predictors, and each worker would be paid his marginal value's worth. Therefore, when informational asymmetries are present, firms act rationally by applying different wage schedules. As equal productivity is compensated by equal wages, this constitutes a nondiscriminatory equilibrium. Nonetheless, this view heavily relies on what is meant by discrimination and could easily be contented by arguing that differential treatment is ready evidence for discrimination.

To my knowledge, there are few studies that explore the dynamic empirically. Gaddis (2014) examines employment opportunities for White and Black graduates from elite, top-ranked universities versus high-ranked but less selective institutions. He finds that credentials from an elite university result in more employer responses for all candidates, but Black candidates from elite universities only do as well as White candidates from less selective universities. Moreover, when employers respond to Black candidates, it is for jobs with lower starting salaries and lower prestige than those of White peers. Here, Black students seem to benefit less from high credentials and are placed in lower pay and lower rank positions. Therefore, the study suggests employers compensate Black university graduates as though they had lower marginal productivity than similar White graduates. Still, there is little to show how this dynamic would apply in reverse, as the Aigner and Cain (1977) model predicts.

The framework has, however, been used by researchers to investigate

how discrimination may be reduced by increasing the use of hard information. Wozniak (2015) suggests pro-drug testing legislation for employees and job applicants improved employment and wages for Black men in low-skilled occupations. Bartik and Nelson (2019) find banning the use of credit card reports in job screenings harms Black workers. Both studies suggest racial and ethnic minority workers benefit from employers' use of fool-proof signals that reduce uncertainty about an individual's ability to perform. This shows how decreasing informational asymmetries between workers and employers may create more equitable labour markets.

Overall, the precise model dynamic has not found broader support from the data. Data points a persistent mean wage gap (Black, 1995). Moreover, the model has been critiqued for not addressing how differential treatment by employers affects workers' choices to invest in cultivating abilities. On these grounds, the model paved the way for a new set of models better equipped to answer these issues.

Statistical discrimination and human capital accumulation

The next wave of statistical discrimination models from the 1980s and 1990s aimed to demonstrate the interlink between human capital accumulation employer discrimination. Lundberg and Startz (1983) argued that if employer perceptions of productivity varied based on group membership, the group more likely to be misjudged would accumulate less human capital. As a result of lower expected returns to their investment, individuals from that group would invest less in their training and tend to work in lower-skill, lower-paying jobs.

Once economists could suggest that human capital accumulation would be affected by employer discrimination, the new human capital models were also situated within a public policy discussion. The labour market equilibria described by the models acted as policy recommendations. Two main sides emerged:

one advocating for regulation of wages, and the other supporting subsidies for disadvantaged workers to enhance their skills.

Lundberg and Startz (1983)

Building on the work of Aigner and Cain (1977), Lundberg and Startz (1983) showed how informational asymmetries and uncertainty lead to wage penalties when employers' choices were assumed to influence workers' perceptions of compensation. In their model, the firm's choice to offer separate wage scales reflects a worker's incentive to invest in human capital. Unlike Aigner and Cain (1977), the researchers argue "[E]conomic discrimination exists when groups with equal average initial endowments of productive ability do not receive equal average compensation in equilibrium."

To prove their case, Lundberg and Startz (1983) constructed a stochastic model of worker characteristics with a unique linear rational expectations equilibrium solution. Firstly, Lundberg and Startz (1983) assumed the market was competitive but characterised by imperfect information. The labour pool consisted of individuals with innate and acquired characteristics that determined their productive abilities. These characteristics were randomly distributed across the population. Individual characteristics were only known by the individual.

A worker's marginal productivity, MP_i , is calculated as the sum of his innate abilities a_i and acquired abilities X_i :

$$MP_i = a_i + bX_i$$

Each individual chooses to purchase a level of X_i . X_i is increasing in marginal cost that reflects diminishing returns the time and money spent on extra training as well as in disutility of irrecoverable leisure. Therefore, the cost of training may

be expressed as:

$$C(X_i) = \frac{1}{2}X_i^2$$
$$C'(X_i) = cX_i$$

In a full-information equilibrium, all workers purchase $\frac{b}{c}$ units of training at a cost $\frac{1}{2} \frac{b^2}{c}$.

Secondly, they assume employers are competitive and maximize profits by setting wages equal to the expected value of the marginal product conditioning expectation on all available information. They observe a test score, y_i , but cannot directly observe the marginal productivity of an individual worker, which is made of both his endowed and acquired human capital. Nonetheless, employers know the density function, with distribution parameters b and d , describing the productive characteristics through a population

As before, the test score measures a worker's marginal product with a random error:

$$y_i = MP_i + u_i$$

Both a_i and u_i are drawn from a bivariate normal distribution where \bar{a} , \bar{u} , σ_a^2 , σ_u^2 are known.

Now to reach a unique linear rational expectations equilibrium, Lundberg and Startz (1983) assume:

1. Each worker attempts to maximize his wages net of educational costs:

$$\max\{w_i - c(X_i)\}$$

where w_i is the wage and X_i signifies ability he has acquired through education.

2. The optimal human capital investment can be written as a linear function of worker characteristics with undetermined coefficients:

$$X_i = \rho_o + \rho_a a_i + \rho_u u_i.$$

3. The firm's problem is to establish a wage offer scale as a function of test scores:

$$\begin{aligned} w_i &= E(MP_i | y_i) = E(y_i - u_i | y_i) \\ &= y_i - E(u_i | y_i) \end{aligned}$$

Since the test score is a linear function of normal variables, the test score too is normally distributed. The mean \bar{y} and variance σ_y^2 are found using (2). The test score y_i and test error u_i are known to have a bivariate normal distribution with the correlation coefficient $(1 + b\rho_u)\sigma_u^2/\sigma_y^2$. It then follows that the expectation of u_i conditional on y_i is:

$$E(u_i | y_i) = \bar{u}_i + [(1 + b\rho_u)\sigma_u^2/\sigma_y^2][y_i - \bar{y}].$$

For the sake of simplicity, the coefficient of $y_i - \bar{y}$ is denoted as $(1 - \beta)$. Through substitution, the wage scale offer then becomes

$$w_i = \overline{MP} + \beta(y_i - \bar{y}).$$

Each worker is offered a wage according to the wage schedule. Consequently, he invests in education only so far that the marginal cost to acquiring more training is equal to the marginal increase in wages. As every additional unit of X increases the marginal product and test score by b , the wages rise by βb . At equilibrium each workers acquire $X_i = \beta \frac{b}{c}$ amount of capital.

Here, the authors point out that the marginal cost and marginal return to each unit of X are identical across the population. This means X is non-stochastic in equilibrium, ρ_a and ρ_u are zero and β reduces to:

$$\beta = \sigma_a^2 / \sigma_y^2$$

In other words, β is the ratio of the marginal "private" returns to the marginal "shared" returns to acquired human capital and depends solely on the relative sizes of the variances of innate talent and testing error.

Lastly, the authors demonstrate the mechanism with two groups. Sticking to the early notation, the groups are called star and diamond. Group star has a more heterogeneous distribution of innate ability and a more homogeneous distribution of testable ability than group diamond, that is $\sigma_a^2(S) > \sigma_a^2(D)$ and $\sigma_u^2(S) < \sigma_u^2(D)$. It follows that $\beta^S > \beta^D$ and employers offer the star and diamond groups different wage schedules. As the star group possesses a more reliable indicator of productivity, this group becomes high-wage and high-investment. $(\beta^S - \beta^D)b/c$ is the amount each member of group star acquires additional training compared to group diamond, as the return to an investment in a unit of X is that much higher.

According to Lundberg and Startz (1983) informational asymmetries may directly influence the two groups' human capital investment choices and wage scales. The authors qualify it as a discriminatory equilibrium, as equally endowed individuals are not equally compensated in wages. They suggest gains in allocative efficiency could be made through policy forbidding separate wage scales and derive a solution where all individuals choose the same level of training. The affirmative action policy they advise would restrict wage offers to equal the expected marginal product conditional on test score, but not group membership.

Coate and Loury (1993)

Others saw the proposed race-neutral wage restrictions as an inefficient solution in an imperfect information environment. Coate and Loury (1993) argued forcing employers to act race-blind, could only result in temporary change if workers could still get away with lower credentials. A better solution to informational asymmetries would be to create incentives for disadvantaged groups to invest

more in human capital to increase their overall level of qualification. Creating incentives to human capital accumulation would avoid pitfalls caused by wage restrictions while addressing employer discrimination.

To demonstrate their logic, Coate and Loury 1993 constructed a self-fulfilling expectations model of statistical discrimination. Once again, employer perceptions of productivity vary based on group membership. In contrast with earlier models, when workers from one group are assumed to be less likely to be qualified, they face stricter hiring standards relative to the other group. The tougher standards precipitate weaker investment incentives in the group that is perceived as less qualified, causing the group members to become less qualified and to sort into low- skill, lower-paying jobs. In other words, the expectation to be less qualified ultimately drives the group to become less qualified, justifying the wage gap.

First, Coate and Loury (1993) assumed that employers are matched at random with workers belonging to a larger population that is formed of two identifiable groups of workers, S and D. Lambda, λ denotes the fraction of S in the population and $1 - \lambda$ the fraction of D. Group membership is a given.

Employers, then, assign workers from groups S and D to either of two tasks; task zero requires no qualification and task one requires qualification. All workers would rather be assigned to task one regardless of their qualification as it provides them with a gross benefit, ω .

Workers, in turn, become qualified by investing in training. The cost to acquiring more training is assumed to vary from worker to another, although the distribution of costs is identical for both groups. The groups are a priori of equal average ability. c denotes a worker's investment cost and $G(c)$ the fraction of workers with an investment cost no more than c .

For both workers and employers the gross and net returns from assignment to task zero are normalized to zero. However, for an employer, the net return of assigning a qualified worker to task one is positive, $x_q > 0$ and the net from assigning an unqualified worker to task one is negative, $-x_u < 0$.

Moreover, employers are unable to discern whether a worker is qualified prior to assignment, and they must rely on the worker's group membership and a noisy signal of qualification (θ). The signal takes the form of an interview or test score. For each group, the distribution of θ is the same on $[0,1]$ and depends on whether a worker is qualified.

Let $F_u(\theta)$ be the probability that the signal does not exceed θ given the worker is unqualified and $F_q(\theta)$ be the probability that the signal does not exceed θ given the worker is qualified. The likelihood ratio at θ is given by the ratio of their density functions ($\varphi(\theta) = f_u(\theta)/f_q(\theta)$) and is assumed to be non-increasing on $[0,1]$. This implies that a higher value for the signal is more likely when a worker is qualified or in reverse, a qualified worker more likely emits a stronger signal.

To ensure only qualified workers will be assigned to the more demanding task, Coate and Loury (1993) assume the employer's choose cut-off standards for both groups. The authors show that this rationale includes a trade-off: a too-high cut-off standard risks failing to assign a qualified workers to task one by mistaking them for unqualified workers, and a too-low cut-off standard risks assigning unqualified workers to task one. Thus, an employer's beliefs about the likelihood of a worker from either groups being qualified plays a role in how the uncertainty is dealt with.

The authors then derive the equilibrium state by considering a worker belonging to one group. According to his prior beliefs, the employer gives the representative member the probability $\pi \in (0, 1)$ of being qualified. If the worker emits a signal θ , following the Bayes' Rule, the employer's updated probability that she is

qualified is given by

$$\begin{aligned}\xi(\pi, \theta) &= \pi f_q(\theta) / [\pi f_q(\theta) + (1 - \pi) f_u(\theta)] \\ &= 1 / \{1 + [(1 - \pi) / \pi] \varphi(\theta)\}.\end{aligned}$$

The employer's expected pay-off from assigning her to task one (conditional on the worker's group and signal) is $\xi(\pi, \theta)x_q - (1 - \xi(\pi, \theta))x_u$ and zero otherwise. The line of best policy is to assign her to task one only if $x_q/x_u \geq [1 - \xi(\pi, \theta)]/\xi(\pi, \theta)$. Using r as the ration of net gain to loss, this becomes $r \geq [(1 - \pi)/\pi]\varphi(\theta)$.

Given that $\varphi(\theta)$ is non-increasing on $[0,1]$, the employer's best choice is to apply a cut-off standard $s^*(\phi)$ which is conditional on group membership:

$$s^*(\pi) = \min\{\theta \in [0, 1] | r \geq [(1 - \pi)/\pi]\varphi(\theta)\}.$$

Thus, any employer harbouring prior beliefs will set the standard $s_i = s^*(\pi_i)$ $i = d, s$ based on the probability that the representative member of a group D (S) is qualified before having observed any signal at all. Since $s^*(\cdot)$ is decreasing in π , higher expectations about a group being qualified will mirror easier standards. (Coate and Loury, 1993)

Next, the authors turn to study the workers and their investment choices. Like Lundberg and Startz (1983), Coate and Loury (1993) assume workers invest only when it's cost does not exceed the expected pay-off. These depend on the gross return from being assigned to task one ω and the increase in probability of getting assigned due to investing. The latter is affected by the standards the workers expects to face. Given the probability to be assigned is $1 - F_q(s)$ when qualified and $1 - F_u(s)$ when one is not, the expected benefit of investment can be written as:

$$\beta(s) = \omega[F_u(s) - F_q(s)],$$

for all workers facing standard s . $\beta(s)$ is a single-peaked function of s , which increases whenever $\varphi(s) > 1$ and decreases whenever $\varphi(s) < 1$, and satisfies

the condition $\beta(0) = B(1) = 0$

Therefore, a worker facing standard s will invest only if for her the cost of investment will be lower than the expected benefit of investment, if $c \leq \beta(s)$. The portion of the group facing standard, s , that will become qualified is, in turn, $G(\beta(s))$.

From it follows that an equilibrium is a pair of beliefs (π_d, π_s) satisfying

$$\pi_i = G(\beta(s^*(\pi_i))), i=d,s$$

At a discriminatory equilibrium, the employer's beliefs become self-confirming. The workers from one group are assumed to be less likely to be qualified and face more exacting standards. Ultimately, through weaker investment incentives, they become less qualified. (Coate and Loury, 1993)

In the following stages of their analysis, Coate and Loury (1993) suggest employers should be able to condition employment offers on group membership. The authors argue a stable nondiscriminatory equilibrium could be created by subsidizing minorities through lowering the cost of c . This would increase the amount of qualified group members, challenge the employers' prior perceptions, and eventually even out the standards.

In other words, their stance does not support a policy that forces employers to act race-blind. They argue an enforced non-discriminatory equilibrium may not last as long as a group can leverage the knowledge that they may be employed despite having lower credentials. As a consequence, employers retain their prior beliefs as minority and majority candidates are still perceived as unequally qualified. According to Coate and Loury (1993) only shifts in perceptions would bring about a stable, non-discriminatory equilibrium.

In a compelling study, Lang and Manove (2011) investigate how informational asymmetries may drive minorities to overinvest in observable productivity traits such as education. Using the Armed Forces Qualifying (AFTQ) to proxy

true ability, they find this is true for workers of average ability. Black workers of average ability attain higher education levels relative to White workers of similar ability but receive lower wages relative to White workers of a similar education. Black workers of above-average levels of ability do not overinvest, yet wages converge. For below-average rates of investment and ability, wages do not converge with White peers. The results suggest that, across levels of ability, there are different investment strategies with different outcomes. It is hard to find one dynamic to explain informational asymmetries and investment choices.

One suggestion is that employers are using cut-off standards as Coate and Loury (1993) posit. The results show only those with high average ability have no Black-White wage gaps to show. It is possible that they emit such strong signals of productivity that employers almost always assign them to harder tasks. All those with less than high average ability — which even overinvestment in education cannot compensate for — are assigned to the less demanding tasks because the cut-off standard for all Black workers is very high.

However, it is implausible to assume that cut-off standards would be relative to all Black workers in the labour pool. More realistically, it would be relative to those who apply for a certain type of position. Therefore, it is hard to say whether the proposed dynamic applies here. More conclusive evidence would need to consider the relative number of Black applicants at each education level, the demand and price of different skills, and rule out unobservable group-level differences that could affect the proposed dynamic.

Legacy in empirical work: human capital and wages

Using discrimination as an endogenous variable that affects wages through human capital investment incentives has made for some difficulties in interpreting empirical data on statistical discrimination.

It is evident from the sparse amount of observational research combining

human capital accumulation and statistical discrimination that it is hard to find a foolproof measure for marginal productivity or skill in data. Lecturing employers about inaccurate and biased judgment cannot be particularly effective when researchers cannot themselves find proxies for marginal productivity to justify theoretical conclusions.

Moreover, there is likely no single measure for productivity across occupations: signals used to deduce productivity differ by the skills required. For another, applying unspecific measures to specific instances may produce very different conclusions on returns to human capital investment, equitable compensation, and employer discrimination. Therefore, discrimination, if and when it exists, may operate very distinctly depending on the profession, sector, or even company.

Ultimately, the overarching theme in statistical discrimination models is whether skill is evaluated objectively. The accurate measuring of skill is tainted by informational asymmetries that cause statistical discrimination and result in wage gaps. Additionally, as statistical discrimination models have evolved, the conception of skill has broadened. Skill is not only something we naturally possess but something that can be cultivated with investment over time. The models suggest workers' investment return- and firms' profit-maximizing strategies are decided relative to it. If any one conclusion should be drawn, higher educational investment and more objective measuring of skill are key for reducing wage and employment gaps.

3.2.3 Implicit bias

There have been sustained efforts to move towards greater racial economic equality in the United States. While overt racism still exists, most Americans consciously oppose racism and genuinely strive for a race-neutral society. Therefore, explicit measures to counteract open discrimination or challenge the racial status quo may no longer be as effective as during the 20th century.

Many may still hold unconscious racial prejudices due to a long history of racial segregation, which could be better addressed on these terms. (Massey, 2011).

Over the last three decades, research has attempted to address the paradoxical nature of current racial relations. In economic literature and elsewhere, implicit bias has been used to elucidate the relationship. In 1998, Greenwald et al. created the Implicit Association Test (IAT) to capture ambiguous, sometimes repressed, and often unintentional mental associations. To study racial bias, test participants were consecutively shown images of a Black and a White person with word pairings such as "good" and "bad" showing on the opposite side of the computer screen. A participant scored a high IAT score when pairings of the word "good" with a White person had shorter response times than with a Black person. Shortly, racial IAT scores were introduced to reflect the rapid neurological response to race-conditioned image-word associations (Bertrand, 2005) and have since been used to accompany laboratory and field experiments that study one-on-one level interactions between labour market agents.

The Implicit Association Test has shown that implicit bias is widespread. Stanley et al. (2011) tested the relationship between social trust and implicit racial attitudes. In the study, the participants took an IAT and were shown numerous images of unfamiliar Black and White males to rate their trustworthiness on a scale of 1 to 9. The study found that stronger implicit bias predicted greater pro-White bias independent of the race of the participant. The authors concluded that implicit associations with social groups are ubiquitous across races and likely to weigh in social settings and informal decisions.

Studies on school and work environments highlight that implicit bias may have a negative feedback effect on productivity and skill development. For one, implicit bias has been found to negatively affect educational outcomes. Chin et al. (2020) find that Black students are more likely to be suspended and to have wider Black-White test score gaps in counties with higher levels of racial

bias in teachers. For another, implicit bias in the workplace may weaken individuals' productivity and income. Glover, Pallais, and Pariente (2017) gathered worker-level data on a French grocery store chain's managers and cashiers who were employed on government-subsidized contracts for six-month trials. They found minority cashiers were more absent, worked shorter hours, and were less productive during shifts with more biased managers. These effects were absent when biased managers were paired with cashiers belonging to the majority. They estimated manager bias led to 2.5% smaller income for minority cashiers working at an hourly rate. By altering one-on-one interactions implicit bias may negatively influence Black-white skill and wage gaps.

Other researchers have used simulations to investigate how implicit bias may undermine racial and ethnic minorities' positions of negotiation. For instance, Milkman et al. (2015) analyze the responses of 6,500 professors from 69 disciplines and 259 universities to a fictional email from a prospective PhD student, varying with race and gender. Their findings show academic institutions with private funding or direct interaction with high-paying disciplines were more likely to dismiss underrepresented minorities seeking advice. This suggests implicit bias may intensify when economic stakes are apparent. In a like-minded study, Kubota et al. (2008) investigate the effect of race on the likelihood of a rejection of an objectively unfair monetary offer. In an ultimatum game where players accept and reject splits of money, he documents that the participants accepted more and lower offers from White players than Black players. Because rejecting an offer led to no monetary gains, the researchers suggested that players may have been more willing to forfeit financial rewards to discriminate against Black proposers. This supports the idea that racial and ethnic minorities may be more readily rejected when money is at stake.

Thirdly, a body of research papers (Bertrand and Mullainathan, 2004; Rooth, 2010; Oreopoulos, 2011; Bartos et al., 2016; Kline et al., 2022) has provided robust evidence to suggest implicit bias causes the acquired and innate skills

of minority applicants to be ignored by prospective employers. A good example is the correspondence study by Oreopoulos (2011). He studies the callback rates of immigrants from many countries in Canada across multiple fields and demonstrates that resumes representing highly educated individuals with English-sounding names generated a 4.4% higher callback rate from Canadian employers relative to identical individuals with foreign-sounding names. The author varied the level of information that should provide counter-evidence for any doubt about language skills but finds the rates constant across levels of information. This is consistent with the notion of employer implicit bias, as employers do not update their views on the candidates with access to valuable, skill-related metrics.

Ultimately, implicit bias depends on the individual. It would seem costly to address each separate case of implicit bias. One solution would be to increase general awareness in organisations about implicit bias. Implicit bias training was developed to this end (Devine et al., 2012) but has had weak success in producing long-term effects in individuals (Lai et al., 2014; Lai et al., 2016; Forscher et al., 2019). The policy failure partially aligns with prior literature that shows prior beliefs may not update optimally even when biased employers acquire counteractive information on minority abilities (Farmer and Terrell, 1996; Reuben et al., 2013). More studies to evaluate possible means to achieve efficient updating deserve future study and documentation, especially since it is possible that increasing human capital for racial and ethnic minorities may only be an effective form of policy when it manages to change prior beliefs.

3.3 Discrimination and Institutions

In parallel with the research on implicit bias, the research on the role institutions play in racial economic disparities has experienced an upsurge in recent decades. For example, Bayer (2016) coined the term "institutional discrimination"

in academic settings as one where what seem to be neutral practices or routines of a department or instructor have disparate effects dependent on race or gender. Relying on a similar definition, there seem to be a score of empirical studies that show how on-surface neutral practices of banks, government, judges, and health providers may have disparate effects by race. The likely underlying mechanism is that institutional mechanisms allow preexistent implicit bias to be perpetuated.

Across studies, the relationship between institutional discrimination and racial economic disparities appears to be either direct or indirect. Lending practices that differ by race have a direct effect on wealth through loan acceptance rates. Court practices that differ by race have indirect effects on employment and income through incarceration rates. Overall, the relationship between institutional practices and racial economic disparities seems to be understudied, perhaps because most of the effects are indirect or secondary.

Public policy

The racially disparate effects of public policy can be overlooked. The EICT might be one such case. EICT was introduced in 1975 to offset the Social Security payroll tax for low-income families with children, and following the 1986 Tax Reform Act, it became a major cash transfer program for low-income families (Hotz and Scholz, 2003).

Numerous studies have been conducted on the positive impact of the Earned Income Tax Credit (Meyer and Rosenbaum, 2001; Hoynes, 2019; Schanzenbach and Strain, 2020). Bastian (2020) suggests that, when the program first began in 1975, it increased maternal employment by 6%. Eissa and Nichols (2005) studied the EITC expansion (1984-2003) and found that by 2003 less educated women with children were as likely to report positive income as their childless counterparts. The EITC has been acclaimed as a success. Moreover, its benefits have been suggested to increase with a minimum wage policy. Rothstein and Nichols (2015) argue minimum wages may make EITCs more effective, as EITC's

positive effect on the labour supply would otherwise drive down the market wage. With minimum wages, the EITC could benefit workers to an even greater extent.

However, some EITC studies find suggestive evidence that EICT can interact with issues of ethnicity and race. For instance, Eissa and Nichols (2005) suggest the overall positive effect on income has masked considerable heterogeneity. They find that between 1982 and 1999, Black single mothers' wages tracked closely to the real minimum wage, while White single mothers' wages were higher and showed no similar trend. Neumark and Wascher (2007) find evidence that EITC boosts employment and income for minority women but note that higher minimum wages seem to reduce the income of minority men, and increasingly so when EITC is high. These two studies are in the minority to caution that EITC in combination with minimum wages may have different income effects by race.

When governmental policy has an unintended, differential effect, it brings to question the design of those policies. For instance, if the EICT aims to reduce poverty, it can be regarded as a well-designed policy. However, if the intended aim is to bolster the income of low-income families and encourage work, we may find that while poverty is reduced, the economic benefits are not evenly distributed across different racial and ethnic groups. Instead of uniformly converging towards a higher level of income, the policy may mask ongoing disparities in income that correlate with ethnicity and race. From the grass-roots perspective, this may indicate that individuals are navigating different incentives and benefits within the framework of a single policy, highlighting the potential inequities involved in the design.

Lending practises

Sometimes, racial disparities are more evident, as is with lending practices. Financial intermediaries such as banks have an important role in providing external debt and encouraging new business ventures, but studies have found

cross-sectional evidence for racial disparities in lending markets for established businesses (Blanchflower et al., 2003; Mitchell and Pearce, 2009). Lending practices are perhaps not so blind to race.

Recently, Fairlie et al. (2020) studied how Black-owned startups compare to White-owned startups in access to capital for new business ventures. By matching administrative data on credit scores, they find Black startups start smaller and remain so as they mature. The accumulated difference in business size by the end of the survey is approximately \$ 336,000 of which two-thirds are explained by firm size, business credit score, and founder's net worth. They suggest Black entrepreneurs are constrained by differences in creditworthiness but are also affected by perceptions of treatment by banks. Black entrepreneurs are more hesitant to apply for loans than White entrepreneurs, even when their credit history and the local bank's support for new business development should encourage them.

A potential mechanism to explain racial disparities in lending is one where the expectation of racial disparities in treatment builds on ready financial disparities to create different trajectories for Black-and White-owned businesses. When a historical racial disadvantage increases the constraints on an individual's access to funding, the distribution of capital takes on a racial dimension.

Health and Legal System

Moreover, it is well documented that labour market outcomes are sensitive to health (Currie and Madrian, 1999; Case and Paxson, 2008; De Nardi et al., 2024) and criminal records (Agan and Starr, 2017; Agan et al., 2024). Bias in health and legal institutions may then also affect labour market outcomes. While the effect would be indirect, differential treatment by these institutions could contribute to differences in wealth, income, and employment.

To start off, health outcomes are markedly worse for all ethnic and racial

minorities with low incomes. In 2019, heart disease and cancer mortality were the highest among Black Americans; HIV death rates were highest for Black Americans, Hispanics, Native Americans, and Alaska Natives (Kochanek et al., 2020). While there are many reasons for these discrepancies, such as lifestyle, nutrition, and lack of access to health care, and health insurance, health systems too could partially be responsible for why the worst outcomes are concentrated in racial and ethnic minorities.

A study by Singh and Venkataramani (2022) shows how hospital providers may exhibit racial bias when hospitals approach maximum capacity. Using time-stamped data (2015-2018) on 17000 patients who were admitted to a large health care system, they found in-hospital mortality and systematic misevaluation of medical needs increased under high-strain conditions for Blacks but not for Whites. Overall, Black patients were found to have fewer complete medical files, less likely to have a co-morbid diagnosis, and more likely to have had weaker provider-patient relationships in the past. Had Black patients been treated like Whites, 15% of the Black patients would not have died. If societal resources are rationed by race as the authors suggest, the resultant health penalty is likely embedded in economic indicators such as employment and income. Such a conclusion is however impossible to draw without more substantive evidence.

On the other side, the racial and ethnic disparities in sentencing and incarceration are widely recorded, as are their negative effects on employment. Of all racial and ethnic groups in the United States, dramatically higher incarceration rates have been documented for Black people (Myers, 1980; Cox, 2010). Bayer and Charles (2018) maintain it is likely a major reason why the Black-White gap in the probability to work has grown between 1960 and 2010.

Research suggests there are three possible concurrent sources of racial bias in the criminal justice system: the prosecutor's initial charging decision, the judicial sentencing decisions, and less-honed judges. Firstly, studies have associated racial and ethnic discrepancies in charging and sentencing with the

discriminatory application of the law. For example, Arnold et al. (2018) use the release tendencies of quasi-randomly assigned bail judges to identify the relevant race-specific misconduct rates and show that bail judges are prone to widespread racial bias toward Black defendants. Estimates from Miami and Philadelphia show racial bias is more pronounced in inexperienced trial judges and ones that work part-time and possibly rely on inaccurate stereotypes that exaggerate the relative danger of releasing Black defendants.

For another, researchers have criticized three-strike laws and minimum sentencing for making discriminatory application of law more striking. When Chen (2018) examined the records of 17,0000 inmates in the California prison system in autumn 2007 for racial and ethnic discrepancies in three-strike sentencing, she found Black and Native American defendants were significantly more likely than Latino and White defendants to receive third-strike sentences regardless of their offense. In turn, Starr and Rehavi (2013) found that more than half of the gap in federal criminal cases from 2007 to 2009 could be explained by the prosecutor's initial decision to bring a charge carrying a mandatory minimum. The researchers controlled for all pre-charge case characteristics and concluded prosecutors were almost twice as likely to bring a mandatory minimum charge against a Black defendant. It is therefore worth noting, as Starr and Rehavi (2013) do, that the discriminatory application of law can be counteracted by reducing such procedural sources of discrimination.

It may not be immediately evident how racial bias in health providers and the US federal court system contribute to racial economic inequality. It is easier to show with institutions like banks that decide who is provided access to financing; in their case, the relationship between racial bias and economic disparities is direct. If health and legal institutions contribute to economic inequality, it is through their effect on economic opportunity. A chronically sick person is less likely to work, and a past convict is less likely to receive employment offers. If these cases are more concentrated within Black people, as seems to be

the case, investigating whether institutional conduct could give rise to racial disparities may further help reduce the racial penalties to employment, income, and wealth accumulation.

4 Past policy and looking forward

4.1 Case studies of past policy

The literature on the policy reforms and remedies that reduce racial disparities in the U.S. economy is extensive. The last two decades of research have provided compelling evidence of how, for instance, minimum wage policy, deregulation of the lending market, and institutional design choices in education may play a role in reducing disparities in economic and academic outcomes. Importantly, the studies showcase how economic and social policies can reduce the economic disadvantages to which Black Americans are disproportionately exposed in the form of lower income, weaker education, a lower socioeconomic background, and lesser wealth.

Studies have provided evidence of the measured, positive effects of policy on White-Black economic and skill gaps. The minimum wage reform of 1966 reduced the gap in wages of low-skilled, low-paid Black workers relative to similar White workers (Derenoncourt and Monitaloux, 2020); the lending market expansions in the 1970s (Chatterij and Seamans, 2012) and 2020s (Atkins et al., 2021) increased access of Black people to lending sources and opportunities in entrepreneurship; both the minority-oriented admission policy of HBCUs (Stassun et al., 2011) and deregulation of public universities in Texas in 2003 (Andrews and Stange, 2019) increased access of low-income minority students to higher-return college programs. While these are only a handful of examples, the studies showcase how policies may reduce racial inequality in economic and intermediary outcomes such as educational achievement. In the following chapter, the findings of these studies will be discussed individually.

There are a some limitations to be noted in analyzing the effects of policy through a handful of studies. Whether all these policies were intended to have such consequences on the economic gap between White people and Black people is uncertain. For instance, in the case of the expansion of the credit market in the late 1970s and during the COVID-19 pandemic, there is nothing to indicate the effects on racial inequality were not accidental, though the positive effects were particularly pronounced for Black people. Additionally, the evidence that the observed positive effects on economic outcomes of Black people are due to their effects on structural sources of racial disparities is only suggestive. There may also be technical errors or other, unaccounted studies that could question these results. As this thesis does not explore these points any further, these are limits to be kept in mind.

Moreover, the set of studies contains an important omission: what research has been done on policy that has reduced Black-White unemployment gap has not been included. Given that education is an important passageway to employment, the studies on educational policy may be considered as a remedying step to account this omission.

Derenoncourt and Montialoux (2020): The Fair Labour Stands Act 1966

Under the 1966 Fair Labour Stands Act, the federal minimum wage coverage was extended to agriculture, restaurants, nursing homes, and other services. Just short of a third of Black workers were employed in these sectors. Derenoncourt and Montialoux (2020) investigate the causal effects of the reform labour market dynamics and find it benefited Black workers significantly.

Firstly, Derenoncourt and Monitaloux (2020) find the gap in average wage between the newly covered industries and the rest of the economy fell. The analysis of short-term effects between industries shows a 5.3% jump between 1966 and 1967 in the annual income of the workers in the sectors that were

covered by the 1966 reform (compared to the annual income of those working in similar sectors that were unaffected). In total, they estimate the minimum wage caused a 20% reduction in the racial income and income gap during the Civil Rights Era.

Secondly, their within-industry analysis shows the over-representation of Blacks in the newly covered industries was an important reason for the reduced economy-wide racial gap. Within these industries, the researchers show the wages increased significantly more for Black than White workers which accounted for 80% of the impact on the economy-wide racial gap. Moreover, the racial income gap between observationally similar Black and White workers fell from 25 log points before the reform to near zero afterward, indicating important decreases in racial discrimination.

Thirdly, the authors found the effects were limited to wages. For instance, the employment effects were near zero. Derenoncourt and Montialoux (2020) find the data is consistent with a competitive model of labour markets with low elasticity of demand for workers and particular inelastic demand for Black workers. They suggest the extremely limited substitution towards White workers might have stemmed from a high degree of occupation segregation, indicating the Act may have also helped reduce the effects of historical discrimination.

Overall, Derenoncourt and Montialoux (2020) suggest the Fair Labour Stands Act of 1966 can be considered an economic policy that had important equalizing effects for the White-Black income gap for two reasons. First, the 1966 reforms increased coverage to sectors where Black workers were overrepresented. Moreover, in the target sectors, Black people relative to White people were concentrated in low-paid, low-education employment. Thus, the Fair Labour Stands Act of 1966 appears to have succeeded at shifting the lower end of the income distribution of Black people which was very fat-tailed at the time relative to the income distribution of White people.

Chatterij and Seamans (2012) and Atkins et al. (2021): Credit market deregulation

In 1978, the US Supreme Court's Marquette decision removed credit card interest rate ceilings in several states, and in 2020, the U.S. government introduced the Paycheck Protection Program (PPP) to support small businesses through the coronavirus pandemic. Chatterij and Seamans (2012) and Atkins et al. (2021), respectively, study the effect of the credit market's expansion on racial disparities in small business lending. While Chatterij and Seamans (2012) use the 1978 ruling to examine the impact of credit card regulation on transitions to self-employment by race, Atkins et al. (2021) study how Black small firms were affected by the PPP as they were offered lending through more varied sources. Both studies find increasing competition decreased barriers to entry for Black entrepreneurs.

First, Chatterij and Seamans (2012) used state-level changes to credit card interest rate ceilings to provide exogenous de-regulatory shocks to the supply of credit card financing. The researchers then exploited this to investigate the within-state change to racial trends in the transition to self-employment between 1971 and 1990. They found the effect of expanded credit card availability was positive and the combined effect of state deregulation and race was greater still for Black rather than White people. Using four alternative measures of historical racial discrimination, they also discovered the combined effect of no ceiling rates and race was larger for Black individuals residing in states with higher levels of past discrimination. Overall, the study suggests increasing competition between credit card companies reduced discrimination-based barriers to entry for Black entrepreneurs.

Interestingly, almost a decade prior, Blanchard et al. (2003) had advanced the idea that discriminatory financial institutions drive Black entrepreneurs to use credit cards instead of business loans. The effects of the 1978 Marquette

decision mirror this intuition: the increase in credit card financing facilitated the entry of Black firms, and the effect was particularly pronounced for those residing in states with a history of discrimination.

Like Chatterij and Seamans (2012), Atkins et al. (2021) show that deregulating policy can be effective. In their study, the authors regressed loan amounts by race and other control variables and compared the regressions for FinTech lenders and the top five commercial banks. Unlike traditional lenders, FinTech firms were found to offer significantly better loans to Black borrowers, likely because the companies rely on hard data about loan applicants and sophisticated algorithms to make lending decisions. The loan gap between observationally similar White and Black loan applicants was 13% for FinTech companies, while this gap was 54% for the top five commercial banks. This led the authors to conclude Black applicants may fare better outside of traditional bank-client loan relationships.

Both studies suggest policies that deregulate the lending market can reduce inequality. In the light of research, Black people appear to face higher barriers to lending market entry for reasons of historical disadvantage in wealth accumulation and/or worse bank-customer relationships. Notably, the studies suggest deregulation can reduce inequalities by creating new, competitive lending channels.

A score of studies: institutional designs in education

A number of studies suggests certain institutional designs in education can improve academic achievement for Black young adults, which in turn can reduce later racial gaps in employment, income, and wealth. For instance, minority teachers tend to have “better perceptions of and higher expectations for minority students” (Dee, 2005) which can increase college enrollment for Black youths (Gerhenson et al., 2019). Moreover, the mathematics test scores of Black male

students have been found to increase most by placing students in academically challenging environments relative to other interventions (Zilanawala et al., 2017). The role of institutional designs that cultivate this potential may, therefore, be important for reducing Black-White academic achievement gaps.

At the center of education in service of underrepresented minorities are Historically Black Colleges and Universities (HBCUs). Their relevance is partially owed to a long history of accepting students from marginalized backgrounds with a readiness to meet the needs of students who would have otherwise not had the opportunity to receive a college education (Albritton, 2012). Put into figures, HBCUs enroll double the amount of Pell Grant-eligible students than non-HBCU institutions, and graduates from HBCUs are 51% more likely to move into a higher-income quintile. Given that 20% of Black students graduate from HBCUs, this is significant (Bevins et al. 2021).

HBCUs can reduce sector-specific minority underrepresentation, as they have done in STEM. In 2010, Black students from HBCUs were more likely to major in biological and physical sciences than those from non-HBCU institutions (Fryer and Greenstone, 2007). In the same year, the largest number of under-represented minority students with STEM degrees were produced by HBCUs (Clewell et al., 2016). Successful collaborations between research institutions and HBCUs have also increased the representation of minorities in Ph.D. programs in STEM disciplines. The Fisk-Vanderbilt Masters-to-PhD Bridge Program, for instance, uses additional coursework, research experiences, one-on-one mentoring, and guidance of faculty members to ease the transition of post-baccalaureate minority students at Fisk to Ph.D. programs at Vanderbilt (Stassun et al., 2011). Between 2004 and 2010, the program attracted a total of 35 students, of which 32 were underrepresented minorities, 60% female with a retention rate of 91%. Therefore, it appears the role of HBCUs and collaborations with research institutions is significant for reducing disparities in racial distributions across sectors and industries.

Researchers have also studied whether institutional price discrimination can aid low-income students. As a prominent example, Andrews and Stange (2019) study the equity and efficiency consequences of greater institutional autonomy in undergraduate education in the case of the deregulation of public universities in Texas in 2003. Their results suggest that low-income students can benefit the most.

Particularly, the study finds the design had a twofold effect. On one hand, it led to an overall increase in price, and on the other hand, the net price for low-income students fell particularly for high-return programs. They estimate that before deregulation, low-income students entered, on average, programs with a 3.7% lower returns in income than middle- or high-income poor students. Following the reform, low-income students shifted to more lucrative programs, such as business and engineering, where they also remained.

Andrews and Stange (2019) highlight how the choice of institutional design was likely instrumental in achieving the effects on low-income students. Before the institutions becoming more autonomous, the regulators required the institutions to set aside some of the generated profit for grant aid and simultaneously increased grant aid for poor students as part of a large need-based state program. Combined with the new pricing, deregulation had the effect of sorting low-income students towards high-income programs, while also raising the prices and quality of lucrative/costly majors. Although the long-term effect on outcomes such as graduation and actual income is unclear, the authors suggest the new design did not worsen long-term outcomes for low-income students.

The combined insight from the studies on the positive role of HBCUs and the positive effect of institutional price discrimination could also be used to evaluate the institutional design of primary and secondary education. As has been earlier noted, the test score gap between Black and White students is still non-

negligible, and therefore schools too could benefit from the investment in the talent of the Black youth. Cultivating spaces where the needs of Black youths from marginalized backgrounds are better understood and the potential of Black students is valued could be beneficial. Fairlie et al. (2014) have suggested hiring more minority teachers could be one solution and deserves more study. Another interesting avenue would be to study the effects of price discrimination in private schools can have on the number of low-income Black students studying in well-funded and highly esteemed primary and secondary schools and what the consequences this has on later academic and economic outcomes.

Together, these studies suggest economic and educational policy can reduce racial economic inequality through, what seems like, repricing schemes. Minimum wages reprice labour to ensure fair compensation; HBCUs reprice the needs of less advantageous backgrounds in terms of expected benefits of providing access to higher education; price discrimination designs of public universities reprice the cost of high-return programs to attract low-income students. Similarly, removing interest rates allows for more flexible pricing of loans, and using hard data in credit scores improves risk profiling and the accurate pricing of loan applications. The studies indicate how diverse policies may increase income, lessen socioeconomic disadvantage, and reduce barriers to lending for Black people by affecting the pricing of labour, loans, and education.

4.2 Looking towards the future: algorithmic decision-making

Recent research has proposed many other solutions to reduce racial disparities. These include organizational policy kits to remedy implicit and explicit discrimination at the workplace (Onyeador et al., 2021), enhancing early childhood education for higher educational achievement (Iruka, 2022), and enhancing auditing tools for anti-discrimination regulators (Kline et al., 2022).

Studies suggest data-driven algorithms have future promise to reduce racial disparities. Algorithmic decision-making can reduce one-on-one discrimination in

markets liable to implicit and explicit biases. Developing effective algorithms has widespread economic importance, as predictive decisions relate to hiring, credit approval, medical testing, college admissions, as well as bail, charging, and sentencing decisions. Presently algorithms are used by the U.S. court system (Stevenson et al., 2019; Arnold et al., 2020), FinTech lenders (Bartlett et al., 2021), health providers (Obermeyer et al., 2019) and firms (Raghavan et al., 2019) to reduce bias by human decision makers.

All researchers and decision makers are not certain the algorithms are fair. One common concern is whether they perpetuate past discrimination (Mayson, 2019). If the algorithms themselves are trained on biased data, the algorithm may then produce biased recommendations, hence the phrase “bias-in, bias-out.” However, when Kleinberg et al. (2017) evaluated whether algorithms improve decision-making in bail decisions, the authors found the welfare gains may be considerable: jailing rate reductions were estimated to be up to 41.9% with no increase in crime rates. The researchers showed these gains were achieved while racial disparities were also reduced, suggesting that algorithms may be more efficient and fair than humans.

Other concerns are also present. One concern relates to whether algorithms should strive to make the decision-making process blind to bias or to make the outcomes more fair. Another is whether the users of algorithmic decision-making are acting out of self-interest or the interest of society. (Rambachan et al., 2020).

Firstly, whether algorithms are fair can be framed as a social planner’s optimization problem. A fair algorithm is either a social planner’s preference that affects how the estimated prediction function is used (Kleinberg et al., 2018) or a constraint on the choice of estimators for the prediction to achieve blindness to certain characteristics (Raghavan et al., 2019). The former is the more widely used criterion.

Kleinberg et al. (2018) argue including protected status characteristics in the prediction function improves both efficiency and equity. Using a nationally representative data set on college students, they find doing so results in higher predicted GPAs among admitted students and higher admission rates for Black students. The authors suggest that equity preferences (in the form of different thresholds) increase the admittance rates of Black students, but overall society is best served by choosing the best possible prediction function for GPA. Consequently, modifying the prediction function by introducing a blinding constraint could omit potentially useful information for efficient choice-making.

Secondly, a social planner is often not control of the prediction function and how it is applied. Firms or other third parties may have differing preferences from those of the social planner and may have incentive to discriminate (Stevenson and Doleac 2019). For instance, Bartlett et al. (2021) find that FinTech algorithms discriminate, though less than traditional lenders, in a manner consistent with extracting monopoly rents in weaker competitive environments or profiling borrowers on low-shopping behaviour.

What is more, the research by Bartlett et al. (2021) reveals how social planners can regulate firms and other third parties. Bartlett et al. (2022) causally identify discrimination through securitised mortgages by using data on Government Sponsored Enterprises (GSEs). GSEs charge each loan a guarantee fee that depends only on the credit score and loan-to-value ratio (LTV). The securities guarantee lenders against credit risk, and thus, any mortgage interest rate differences between loans within a given GSE grid cell of credit score and LTV reflect strategic pricing decisions on the part of lenders. In other words, the researchers exploit their knowledge of what factors should determine interest rates to determine whether discrimination is present or not. Similarly, a social planner's regulation strategy may rely on what it can require firms to disclose about their algorithms. Given that a social planner would want to let the firms use all characteristics for prediction and make them abide by anti-discriminatory law,

algorithmic auditing could be one possible strategy to implement.

Lastly, algorithmic decision-making offers a viable solution to address racial implicit and explicit bias across markets. Its use as an anti-discriminatory tool has been widely recognised by public and private agents alike. The research in algorithmic debiasing is set for multiple paths: reducing error in the algorithms, understanding how human decisions compare to machine predictions, and finding optimal regulation policy. These are all concerns of algorithmic fairness. Current and future challenges include assessing misclassification rates in training data, developing robust training procedures, quantifying residual discrimination in algorithms, understanding efficiency-equity trade-offs between algorithmic constructs, optimizing the regulation, and monitoring the use of machine predictions to ensure compliance with anti-discrimination laws.

5 Conclusion

The economic inequality between Black and White people in the United States is shown by data and research on Black-White gaps in wages, employment, and wealth. This thesis finds many studies to suggest that much of the group-level differences in economic outcomes are driven by differences in skills and human capital accumulation. Investment in education is important, but socioeconomic mobility may be constrained by factors such as access to college education, unobserved differences in school environments, generational wealth, socioeconomic background, as well as historical and present discrimination.

The reviewed literature on explicit and implicit racial discrimination highlights Black-White gaps in economic outcomes may also be sensitive to prejudice, negative stereotypes, and implicit bias in employers and other decision makers. Discrimination, as the theoretical models describe it, however, is often hard to verify. At the very least, this thesis shows the conception of economic discrimination has evolved with time, and simultaneously discrimination has become

more subtle. Moreover, the research on public policy, financial, and educational practices, health providers, and the U.S. court system suggests institutional practices may contribute to the persistence of a gap between Black and White people in access to economic opportunity. To fully sustain the link between institutional practices and racial economic gaps, this line of argument would need more evidence.

In this thesis, I have shown that racial economic inequality can, however, be remedied by diverse policies. Many studies indicate that educational institutions, labour, and financial markets are important creators of new economic opportunities and prosperity for Black people, particularly when combined with policies that address low income, historical disadvantage, or socioeconomic disadvantage. Moreover, studies suggest algorithmic debiasing could provide a new widespread solution for explicit and implicit racial biases in decision-making when future investment in data quality, the design of regulation, and the balance between human, and machine decision-making are carefully managed.

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