A Simple Model of Group Conflict, Inequality, and Stratification

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Abstract

We present a simple model of group conflict between a dominant and a marginalized group that builds on arguments advanced by Lewis (1985). The model formalizes several key insights of stratification economics (Darity, 2005): i) discrimination is a costly activity pursued by dominant groups in order to maintain their relative status; ii) however, not every member of the dominant group needs to fully engage in discriminatory effort. In other words, dominant group members can free ride on discriminatory actions taken by members of the same group; iii) marginalized group members have limited ability to counter discriminatory behavior; iv) discrimination is wasteful from a societal standpoint, but v) it persists because of the dominant group's interest in maintaining their relative power and of the costly and imperfect nature of anti-discrimination enforcement. In particular, we show that when the burden of proving discriminatory behavior falls on individuals in the marginalized group, discrimination will never be completely removed. Finally, through the introduction of a simple bequest motive in the preferences of the two groups' individuals, we show how racial income inequality reverberates into wealth inequality (i.e. stratification), and we discuss the role of reparations in mitigating such outcomes.

Keywords: Group Conflict, Stratification, Racial Inequality.
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1 Introduction

Stratification economics views racism and other forms of intergroup discrimination as a rational defense mechanism of the dominant group (Chelwa, Hamilton, and Stewart, 2022). The dominant group derives material and psychological benefits from *prejudicism*. Material benefits come in the form of intergenerational transfer of resources that is kept within a certain group; while psychological gains arise through the identification with certain groups. Identifying with the dominant group gives someone a sense of entitlement for their supreme 'absolute' group positioning.

According to stratification economics, prejudicism is therefore a purposeful action because it is instrumental for a dominant group toward maintaining its position. Markedly, this runs counter to other theories of discrimination. For example, Allport (1954) proposes that racism is a result of irrational stereotypes about a marginalized group. Such irrational belief is born out of previous societies. Although it may be true that ideas of racism are due to previous ways of thought, Allport's argument misses the vital point that there is purpose for intergroup prejudicism because it grants advantages to the dominant group. His view also misses the historical beginning of specific forms of prejudicism by reducing it to 'previous ways of thought.' On the other hand, Eric Williams' seminal work *Capitalism and Slavery* (Williams, 2021) details the origin of racism in the New World. He argues that racism is the consequence of slavery, not the other way around. In this sense, racism was a purposeful action, in line with the view from stratification economics.

Akerlof and Kranton (2000) sees group identification stemming from cultural differences, and Fang and Loury (2005) believe that some groups adopt behaviors that lead to them being 'unsuccessful.' From the perspective of stratification economics, both of these arguments are wrong. Cultural differences exist and play a role in forming groups, but the real cause of racism is the many benefits it confers to the dominant group. Thus, from the perspective of stratification economists, both Akerlof and Kranton (2000) and Fang and Loury (2005) appear like exercises in 'blaming the victim,' because they reasons as marginalized groups in fact choose to be unsuccessful to conform with their racial identity, while ignoring the institutional barriers created by the dominant group that lead to their marginalization.

The beginning of stratification economics is associated with the contribution by Darity (2005), where he describes the main tenets of the field. We outline them here: (i) Intergenerational transfer of resources is the focus of inequality and power between groups; (ii) material benefits to dominant groups incentivize them to continue their behavior; (iii) discrimination will likely persist; (iv) Individuals in the marginalized group might attain high skills, but this does not mean they will automatically move to the dominant group; (v) some individuals might

behave counter to the proliferation of their group identity, or 'invest' in the dominant identity, but even this will not be enough to stop discrimination.

Although Darity (2005) is usually given credit for initiating the field, much research was done to lead up to its genesis. Veblen (1899) put forth the idea that people behave in emulation and comparison to one another. Between-group comparisons are the most important for the psychology of an individual, followed by within-group comparisons. The notion of 'psychological wage' was coined by Du Bois (1992) to describe the social advantages given to even the poorest white workers because of their skin color. Further, Blumer (1958) argues that racial prejudicism is about group positioning and the associated material advantages from this position. Labor market discrimination was described by Alexis (1973) as stemming from group identity: white individuals who run firms would rather pay wages to those in their own group. Lastly, our contribution owes much to ideas advanced by Arthur Lewis Lewis (1985), who describes intergroup discrimination as the conflict between competing groups (see just below).

The 'rationality' of discriminatory behavior of discrimination stemming from group formation does not mean that all individuals in a dominant group pursue active discrimination. Groups are formed through discrimination because of economic benefits. This becomes so deeply integrated to society it turns into an institutional feature: it becomes the norm. According to Social Dominance Theory (Sidanius and Pratto, 1999), institutional discrimination is solidified through 'legitimizing myths.' The dominant group maintains their power through the control over military, law, ideology, and discourse tools. Control allows them to legitimize, and dynamically change, the myths over time. As an example, the myth of racism in the US went from black people having inferior physical and mental capabilities, to them having poor decision-making skills. Thus, discrimination is purposeful through the use of power to legitimize myths, which enforces and maintains the degradation of a marginalized group. Moreover, it continues over time and confers positive social values —better access to quality food, health, and education— to the dominant group in the process.

Today, there is an ample body of literature within the field of stratification economics. For an extensive overview of the field see Darity (2005; 2022) and Chelwa, Hamilton, and Stewart (2022). Much of the research has to do with racial relations in the USA, for good reasoning, but it can be applied to group relations in any country where discrimination is present. Places like Japan, Hungary, Brazil, India, and others have discrimination based on race, religion, caste, or class (Darity, 2022). Stratification economics could also be used to describe differences between countries and regions, which is related to the North-South dichotomy. Price (2003) explains the poverty felt by many nations in South as a direct result of colonialism.

Researchers have tested the hypotheses of stratification economics to see if discrimination is in fact a group phenomenon and if it still is relevant for today's world. Price (2008) and

Banerjee (2015) find that black communities have to wait longer for authorities after a natural disaster. Ards *et al.* (2015) conclude that there is an unequitable access to credit based on race. Labor market discrimination between white and black individuals are persistent even at same education levels. At every level of education, there is a relatively constant 2 to 1 ratio between black and white unemployment Hamilton (2020). Jones and Schmitt (2014) argue that the recent unemployment rate for black graduates is higher than 12%. On the topic of education, Paul *et. al.* (2016) discvovers that due to lower incomes, black students need to borrow more money to finance their college education. In a study on the racial disparities from the impacts of the Great Recession, Famighetti and Hamilton (2019) find that increased barriers to home ownership have been placed for black families. Jemal *et al.* (2008) studies the relationship between race and mortality. They find evidence of racial differences in mortality outcomes, and this difference is amplified as education is increased. Lastly, Hamilton and Chiteji (2013) explain wealth gaps through bequests passed down generations. This list is not exhaustive of all the empirical research done within stratification economics, but it does highlight that group based discrimination is real and persistent in our society.

In light of this growing literature, this paper aims at formalizing some of the above main tenets of stratification economics in a simple, but non-conventional, equilibrium model. Our starting point is the summary of the arguments made in Lewis (1985) by Chelwa, Hamilton, and Stewart (2022):

> Consistent with sociologist Blumer's (Blumer, 1958) perspective on group-based prejudice, stratification economics views race prejudice as largely a defensive reaction; a protective mechanism that is intentional in its preservation of social hierarchy. Prejudice works to enhance the relative position of the dominant group. Nobel Laureate Sir Arthur Lewis (Lewis, 1985), in his book *Racial Conflict and Economic Development*, described how dominant groups maintain their social hierarchy positioning by rendering subordinate groups noncompeting. He explains that in the pre-market stage, when individuals acquire skills and credentials to compete in the marketplace, the dominant group tends to use their power to limit subordinate group members access to such skills and credentials, so as to ultimately render them noncompeting at the market stage.
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> According to Lewis, when members from subordinate groups are able to overcome premarket barriers and become competitive, dominant groups deploy new strategies in a second stage, called the market stage. The first strategy in the market stage is to change the credentialing criteria so as to favor their own attributes (i.e., changing the rules in the middle of the game); the second strategy is to simply discriminate against competing members of the subordinate group. The Lewis

conception of rendering groups competing and noncompeting presents discrimination as a strategic behavior with the intent to preserve group-based social hierarchy. Likewise, to the extent that individuals have agency in determining or codifying their group-based identity, they are incentivized to invest in that identity similar to how a firm is incentivized to invest in a particular input in their production process. Hence, as the social value (or market price) of a group-based identity like Whiteness rises, so will an individuals incentive to invest in that identity. Hence, stratification economics analogizes own group identity investment/ divestment as a derived demand for the production of identity output itself, which garners economic return or sanction.

Our goal is then to outline a simple model capturing the following basic aspects of discrimination according to stratification economics:

1. Discrimination is a purposeful activity pursued by dominant groups in order to maintain their relative status. In the present context, the implication is that dominant groups will be willing to spend effort in order to worsen the relative position of individuals in marginalized groups.

2. However, not every single member of the dominant group needs to be fully engaged in discriminatory behavior. A dominant-group member can benefit of discriminatory activities by members of the same group, without having to necessarily discriminate. In other words, dominant-group members can *free ride* on past or current discriminatory activity by members of the same group and still improve their relative status over marginalized groups. Nevertheless, it must be the case that some discriminatory effort must have been spent for stratification to exist in society.

3. Discriminated groups have limited or no ability to counter discriminatory behavior. In other words, dominant groups exercise discriminatory power over marginalized groups, but the opposite is not true.

4. Discrimination not only leads to inequality, but is also wasteful from a societal standpoint, because it diverts resources away from maximizing a society's market income. Yet, it persists because of the dominant group's goal of maintaining their relative status and because of imperfect enforcement of anti-discriminatory practices.

5. Through intergenerational bequests, racial income inequality translates into corresponding wealth inequalities across racial groups, i.e. stratification.

6. Finally, marginalized group members who have the means to do so can spend resources to 'invest in the dominant identity' in order to reduce the harm caused by defensive/discriminatory activity by the dominant group. This will in general lessen the effects of discrimination but not eliminate it altogether.

To our knowledge, the theoretical model proposed in this paper is original, although the concepts are derived from Lewis (1985). Other theoretical models of stratification economics have been proposed in the literature, but they focus on somewhat different aspects than ours. In Stewart (1997), racial identity is a commodity that is produced. Depending on the specific racial identity, externalities from this production can be positive or negative. A key aspect of this model is that when groups are formed, each group is incentivezed to become the dominant one. Darity, Mason, and Stewart (2006) use the tools of evolutionary game theory to analyze wealth accumulation and racial disparaties. An individual can choose to maintain their race, switch racial identity, or become independent of race. The result is three possible equilibria, one where everyone is independent of race, one where everyone belongs to racial groups, and a mixed one.

Conversely, we model the choice of skill acquisition through investment in 'human capital' in the *non-market* phase of the life of economic agents; and the resulting market income for two groups of individuals. We assume that the dominant group has the power to restrict the ability to, or reduce the effectiveness of, the marginalized group's investment in education. Our results correspond with the main tenets of stratification economics as outlined by Darity (2005). Equilibrium is characterized by persistent income inequality between the dominant and marginalized group. Such inequality is inefficient in the Pareto sense: a benevolent planner would spend no effort in discriminatory activities. We then carry a policy exercise in which the burden of proving discriminatory behavior falls upon individuals in the marginalized group. The main result of this exercise is that even in this case discrimination will not be completely removed, given the limited resources that are available to marginalized group members because of stratification-driven inequality in incomes. Finally, we study a simple extension of the model with an individual bequest motive that provides a link from income to wealth inequality, and we discuss the role of reparations in this context.

2 Model

Consider a society composed of two groups, M (for marginalized) and D (for dominant). Individuals in both groups live for two periods: a *pre-market* period, when they invest in skills that determine their market income, and a *market* period, where their investment becomes

income.[1]

Importantly in what follows, an individual in group D can inflict economic harm by engaging in discriminatory activities against individuals in group M, but the reverse is not true. Discriminatory effort by group D-individuals has the goal of making M-individuals *non-competitive* in a market setting. Yet, D-individuals can benefit from discriminatory activity by members of the same group without having to bear the full cost of discriminatory activities themselves.

2.1 Individuals in the Marginalized Group

An individual $j = 1, \ldots, Q$ in group M chooses how much to invest in acquiring skills in the pre-market phase of her life in order to increase her income (become competitive) in the market phase. Market income is denoted by y_j^M and is a function of $h_{j,M}$, which denotes effort provided in acquiring a marketable skill by individual j in group M. However —and this is crucial— the M-individual's market income can be affected by the total discriminatory effort $d \in [0, 1]$ exerted by group D. Thus, we postulate a function $y_j^M(h_{j,M}; d)$ that describes the skill-acquisition technology for an individual in group M as a function of her own investment and the discriminatory effort by the other group. We make the following assumptions:

1. $y_j^M(0, d) = 0$ (No-free lunch).

2. $\partial y_j^M / \partial h_{j,M} > 0$ (Productive investment); $\partial^2 y_{j,M} / \partial h_{j,M}^2 < 0$ (Strict concavity).

3. $\partial y_j^M / \partial d < 0$ (Economic harm from discrimination).

To sharpen our conclusions, we assume the following Cobb-Douglas functional form:

$$y_j^M(h_{j,M}, d) = A h_{j,M}^{\alpha} (1 - d)^{1-\alpha} \;\; \alpha \in (0, 1), \;\; A \in (0, 1) \tag{1}$$

where A is a positive productivity parameter, restricted to be within the unit interval for model consistency (see equation 9 below). We also postulate that individual j in group M begins her life with an endowment w_j^M of inherited wealth. Assume that decision-making in the pre-market stage of one's life does not involve a decision on consumption and saving (more on this later). The total material resources available to an individual in group M through her life is therefore $w_j^M - h_{j,M} + y_j^M(h_{j,M}; d)$ and what is basically equivalent to a participation constraint in contract theory requires that human capital investment makes the person at least indifferent

[1] We do not explicitly model firm behavior in this paper: our assumption is that individuals invest in skill acquisition in the non-market phase of their life to then run their own small enterprises that generate market income in the second period.

between investing or not. In other words, it must be true that

$$w_j^M - h_{j,M} + y_j^M(h_{j,M}, d) \geq w_j^M \tag{2}$$

which reduces to $y_j^M \geq h_{j,M}$. The choice faced by individual M is to invest in $h_{j,M}$ to maximize market income. Assuming the participation constraint to be binding, we find the following reaction function relating skill investment to discriminatory spending by the other group:

$$h_{j,M}(d) = h_M(d) = (\alpha A)^{\frac{1}{1-\alpha}} (1 - d) \tag{3}$$

which is equal across the j individuals in group M and linearly decreasing in d given the assumption on technology: more discriminatory efforts by the dominant group reduce skill investments by the marginalized group members. This captures Lewis's point about the ability of dominant groups to limit access by subordinate groups and ultimately make them non-competitive at the market stage. The corresponding market income for an individual in group M as a function of group D's discriminatory effort is:

$$y_j^M(d) = y^M(d) = \alpha^{\frac{\alpha}{1-\alpha}} A^{\frac{1}{1-\alpha}} (1 - d) \tag{4}$$

By construction, every M-individual spends the same amount on skill-acquisition and earns the same income up to the extent of discrimination by the dominant group.

2.2 Individuals in the Dominant Group

An individual $i = 1, \ldots, N$ in the dominant group is not discriminated against. Thus, under the assumption of no differences in talents between groups, the technology transforming skills $h_{i,D}$ into market income y_i^D is simply $y_i^D(h_{i,D}) = A h_{i,D}^{\alpha}$. The participation constraint for this person, who starts with initial assets w_i^D, requires that

$$w_i^D - h_{i,D} - d_i + y_i^D(h_{i,D}) \geq w_i^D \tag{5}$$

which reduces to $y_i^D \geq h_{i,D} + d_i$. Individual $\{i, D\}$ chooses $h_{i,D}$ and d_i so as to maximize her market income y_i^D while *minimizing* the market income of the marginalized group, subject to the participation constraint above. This captures the point that discrimination is purposeful and aimed at creating (or perpetuating) the dominant group's economic advantage. It will imply that, in equilibrium, dominant group members will earn higher income over members of marginalized groups.

We now turn to the free riding issue in discriminatory activity. We suppose that total discrim-

inatory effort by group D is a weighted average of the discriminatory effort by its members. In particular, we assume that

$$d \equiv \eta d_i + (1-\eta) d_{-i} \tag{6}$$

with the usual game-theoretic notation: $d_{-i} \equiv \sum_{q \neq i} d_q$. The problem faced by an individual in group D is: given d_{-i},

$$\begin{array}{rl} \max\limits_{\{h_{i,D}, d_i\}} & -y^M(h_M, d_i; d_{-i}) \\ \text{s. t.} & y^D(h_{i,D}) \geq h_{i,D} + d_i \end{array} \tag{7}$$

The choice of human capital investment gives:

$$h_{i,D} = (\alpha A)^{\frac{1}{1-\alpha}} \tag{8}$$

while at an interior solution, the extent of discriminatory effort (see Appendix A) is :

$$\begin{array}{rcl} d_i & = & \left(\dfrac{1-\alpha}{\alpha}\right) h_i \\ & = & \left(\dfrac{1-\alpha}{\alpha}\right) (\alpha A)^{\frac{1}{1-\alpha}} \end{array} \tag{9}$$

equal across all the i individuals in the dominant group. Note that the choice of discrimination effort increases in the productivity parameter A. The implication is that the dominant group must allocate more discriminatory effort as the members of the marginalized group becomes more productive. Accordingly, the model predicts that efforts toward racial stratification increase as the productivity —or, more generally, the prominence— of the marginalized group increases.

3 Equilibrium

An equilibrium consists of a choice $h_{j,M}$ that maximizes income for all j individuals in group M given d, and choices $\{h_{i,D}, d_i\}$ that minimize the market income of group M-individuals and maximizes the market income of all the i- individuals in group D. The equilibrium value of skill investment by group M is found plugging (9) into (3) using the fact that $d_i = d \, \forall i$, and is given by:

$$h_m^E = (\alpha A)^{\frac{1}{1-\alpha}} \left[1 - \left(\frac{1-\alpha}{\alpha}\right) (\alpha A)^{\frac{1}{1-\alpha}}\right] \tag{10}$$

We can then calculate the two groups equilibrium incomes and the extent of market income inequality due to active discriminatory practices by simply plugging in the choices of D, h_M

and h_D from equations (3), (8), (9). For an individual in group M, market income is given by

$$y^{E,M} = \alpha^{\frac{\alpha}{1-\alpha}} A^{\frac{1}{1-\alpha}} \left[1 - \left(\frac{1-\alpha}{\alpha}\right)(\alpha A)^{\frac{1}{1-\alpha}}\right]^{1-\alpha} \tag{11}$$

while for group D:

$$y^{E,D} = \alpha^{\frac{\alpha}{1-\alpha}} A^{\frac{1}{1-\alpha}} \tag{12}$$

Therefore, market income inequality between individuals in the two groups, measured as the ratio $y^{E,D}/y^{E,M}$, is:

$$\frac{y^{E,D}}{y^{E,M}} = \frac{1}{\left[1 - \left(\frac{1-\alpha}{\alpha}\right)(\alpha A)^{\frac{1}{1-\alpha}}\right]^{1-\alpha}} > 1 \tag{13}$$

4 Welfare

We consider the choice of h_M, h_D, d by a benevolent planner that aims to maximize the society's net average market income

$$y \equiv \frac{1}{N+Q}\left[\sum_{j=1}^{Q}(y_j^M - h_{j,M}) + \sum_{i=1}^{N}(y_i^D - h_{i,D} - d_i)\right]$$

taking into account that all D-individuals allocate the same amount of effort to discrimination. Defining $\mu \equiv Q/(N+Q)$ as the share of the marginalized group in the economy's given population, it is easy to verify that the corresponding average market income y is monotonically decreasing in the discriminatory effort d:

$$\begin{aligned} y &= \mu[Ah_M^{\alpha}(1-d)^{1-\alpha} - h_M] + (1-\mu)[Ah_D^{\alpha} - h_D - d] \\ &\text{with } \partial y/\partial d < 0 \text{ always} \end{aligned} \tag{14}$$

which implies that the planner chooses to allocate no resources to discriminatory activities. Consequently, the welfare-maximizing solution involves allocating the same amount of investment for the two groups: $h_D^* = h_M^* = (\alpha A)^{\frac{1}{1-\alpha}}$. It is also egalitarian: $y^{*D}/y^{*,M} = 1$.[2]

Thus, our analysis confirms the wasteful nature of discrimination from a stratification economics standpoint, given that it diverts resources from otherwise productive activities. The important implication is that stratification inequality is also inefficient, if the goal is to max-

[2]The same conclusion would be true if the welfare function was multiplicative instead of additive, with geometric weights μ and $1-\mu$ for the two groups respectively.

imize a society's standard of living. In this sense, our analysis also resonates with one of the arguments made by Heather McGhee in her recent book *The Sum of Us* (McGhee, 2021), according to which, after the Civil Rights movement and its successes, white people in the US have willingly renounced to public goods that actually benefited them in order to exclude non-whites from their fruition.

5 Anti-Discrimination Policy

In principle, the efficient allocation involving no discrimination could be achieved by introducing policies that make it harder for the dominant group to inflict economic harm to the marginalized group, thus lessening the strength of discriminatory efforts by group D. For example, with anti-discrimination effort by the government taking a value of $\varepsilon \in [0, 1]$, the market income of an individual in group M becomes $y^M = Ah_M^\alpha[1 - d(1 - \varepsilon)]^{1-\alpha}$, which eliminates the economic effects of discrimination when $\varepsilon = 1$. However, anti-discrimination policies are never fully enforced in real life, and this is enough for discrimination to persist in society. For now, assume $\varepsilon \in [0, 1)$: we will show below that there are economic reasons to expect that anti-discrimination efforts will fall short of removing inequality.

The reaction function by group M, now a function of the total discrimination effort by group D and the anti-discrimination enforcement effort ε, becomes:

$$h_M(d; \varepsilon) = (\alpha A)^{\frac{1}{1-\alpha}} [1 - d(1 - \varepsilon)] \tag{15}$$

and the market income for an individual in group M is

$$y^M(d; \varepsilon) = \alpha^{\frac{\alpha}{1-\alpha}} A^{\frac{1}{1-\alpha}} [1 - d(1 - \varepsilon)] \tag{16}$$

The problem solved by a group-D individual becomes: given ε,

$$\begin{aligned} \max_{\{h_{i,D}, d_i\}} \quad & -y^M(h_M, d_i^\eta d_{-i}^{1-\eta}(1 - \varepsilon)) \\ \text{s. t.} \quad & y_i^D(hi,_D) \geq h_{i,D} + d_i \end{aligned} \tag{17}$$

which, given that the resource constraint is unchanged, gives the same choice of discriminatory effort as in (9). What changes is not the extent to which the dominant group will attempt to discriminate, but how effective the discrimination effort will be. Accordingly, in equilibrium we have that group D's income is the same as (12), while market income for an individual in

group M will be

$$y^{E,M}(\varepsilon) = \alpha^{\frac{\alpha}{1-\alpha}} A^{\frac{1}{1-\alpha}} \left[1 - (1-\varepsilon)\left(\frac{1-\alpha}{\alpha}\right)(\alpha A)^{\frac{1}{1-\alpha}}\right]^{1-\alpha} \tag{18}$$

and market income inequality is given by

$$\frac{y^{E,D}}{y^{E,m}(\varepsilon)} = \frac{1}{\left[1 - (1-\varepsilon)\left(\frac{1-\alpha}{\alpha}\right)(\alpha A)^{\frac{1}{1-\alpha}}\right]^{1-\alpha}} \tag{19}$$

which of course reduces to equality under $\varepsilon = 1$, that is under full enforcement of anti-discriminatory measures.

A reasonable question is then why anti-discriminatory measures are not fully enforced. A plausible answer may be that it is costly to do so, especially if the group (or individual) that is discriminated against has to incur into the legal or bureaucratic costs of proving that there was discrimination against itself or its members. Suppose that group M bears the cost (for example, the burden of the proof in legal cases) of ensuring enforcement, and suppose that such cost is strictly convex: $c(\varepsilon) = \frac{1}{2}\varepsilon^2$. A group M-individual will now solve:

$$\max_{\{h_M, \varepsilon\}} \quad A h_M^{\alpha}(1 - d(1-\varepsilon))^{1-\alpha} - h_M - \tfrac{1}{2}\varepsilon^2 \tag{20}$$

The market income-maximizing choice of h_M is the same as (15) above. The perhaps striking result is that

$$\varepsilon = \left(\frac{1-\alpha}{\alpha}\right)(\alpha A)^{\frac{1}{1-\alpha}} = d \tag{21}$$

which, despite being exactly equal to the discriminatory effort provided by group D, is not enough to ensure full enforcement of anti-discriminatory measures. In fact, we have that in equilibrium:

$$\begin{aligned} h_M &= (\alpha A)^{\frac{1}{1-\alpha}} \left\{1 - \left(\tfrac{1-\alpha}{\alpha}\right)\alpha^{\frac{1}{1-\alpha}} A^{\frac{1}{1-\alpha}} \left[1 - \left(\tfrac{1-\alpha}{\alpha}\right)\alpha^{\frac{1}{1-\alpha}} A^{\frac{1}{1-\alpha}}\right]\right\} \\ &= (\alpha A)^{\frac{1}{1-\alpha}} \left[1 - d(1-d)\right] \end{aligned} \tag{22}$$

Thus, we find that, if the burden of proving discrimination is costly for the discriminated against, discrimination won't be eliminated despite the anti-discrimination effort coincides with the dominant group's extent of discriminatory effort.

6 Investment in the Dominant Identity

The same setup advanced in the previous section can be used to think through the possibility that a marginalized individual invests in the dominant identity in order to reduce the adverse effects of the defensive (discriminatory) actions by dominant-group members. The important point here is that investing in the dominant identity is costly for marginalized group members, with the implication that it is unlikely that even such investment will be enough to erase the effects of discrimination.

7 Wealth Inequality

If members of the two groups end up with unequal incomes because of active discrimination by the dominant group, it is to be expected that such inequality will reverberate into wealth disparities and end up stratifying the society by race. Let us make this point in a very simple intergenerational altruism framework that builds on Galor and Zeira (1993). An individual in group $r = \{M, D\}$ earns income y^r in the market stage of her life; and has utility defined over consumption c and bequests b: $u^r(c_r, b_r) = \beta \ln c_r + (1-\beta) \ln b_r, \beta \in (0,1)$. Every individual has one parent and one child, so that population is constant and there is no issue of allocating bequests among several children. The participation constraint for this individual needs now to take into account the possibility of not investing in skill acquisition but instead investing the inherited wealth in a risk-free asset yielding a rate of return ρ. Thus, we have for the M-individuals and the D-individuals respectively:

$$w_j^M - h_{j,M} + y_j^M(h_{j,M}, d) \geq w_j^M(1+\rho) \tag{23}$$

$$w_i^D - h_{i,D} + y_i^D(h_{i,D}) - d_i \geq w_i^D(1+\rho) \tag{24}$$

Since the utility function is Cobb-Douglas, the allocation of consumption and bequests is given by constant fractions of the market income for each individual minus the opportunity cost of the forgone interest income:

$$c_r = \beta(y^r - \rho w^r) \tag{25}$$

$$b_r = (1-\beta)(y^r - \rho w^r) \tag{26}$$

The amount bequeathed by a parent is nothing but the wealth inherited by an individual in the non-market stage of her life $b_r = w^r, r = \{M, D\}$. Accordingly, we find the following

recurrence equation tracing the evolution of wealth for individuals in group $r = \{M, D\}$:

$$w^r_{t+1} = (1 - \beta)(y^r - \rho w^r_t) \tag{27}$$

which has a steady state at:

$$w^r_{ss} = \frac{1 - \beta}{1 + (1 - \beta)\rho} y^r \tag{28}$$

and implies that the long-run extent of wealth inequality is simply

$$\frac{w^D_{ss}}{w^M_{ss}} = \frac{y^D}{y^M} \tag{29}$$

in turn equal to income inequality in equation (13). Of course, this is quite crude: in a more complicated model one would consider the role of compound interest in affecting the racial wealth gap which, in the real world, is larger than the racial income gap.

7.1 Reparations

The simple wealth inequality framework above can be used to analyze the effects of reparations to the marginalized group. Reparations have been proposed as a potential solution for group-based inequality (Darity and Mullen, 2020). In the present framework, the simplest is to assume that reparations are given to an individual during the market stage of their life. For the sake of simplicity, we abstract here from the problem of funding reparations. We also assume that the individual and the rest of their family lineage has perfect altruism for one another. This means they divide the reparations in equal portions across all generations. It is a rather unrealistic assumption since a person would have to know how many generations their family tree will run into the future, but it gives the best case scenario for the usefulness of reparations as a policy. Let the portion of reparations for each generations be denoted by R: the equation tracing the evolution of wealth for individuals in the marginalized group becomes:

$$w^M_{t+1} = (1 - \beta)(y^M + R - \rho w^M_t) \tag{30}$$

The steady state is:

$$w^M_{ss} = \frac{1 - \beta}{1 + (1 - \beta)\rho} [y^M + R] \tag{31}$$

and the extent of wealth inequality is now:

$$\frac{w^D_{ss}}{w^M_{ss}} = \frac{y^D}{y^M + R} \tag{32}$$

Using equation (13) we can then solve for the required reparation transfer needed to achieve equality:

$$R = y^{E,D} - y^{E,M} = 1 - \left[1 - \left(\frac{1-\alpha}{\alpha}\right)(\alpha A)^{\frac{1}{1-\alpha}}\right]^{1-\alpha} \tag{33}$$

There are several reasons, however, to think that such amount will not be enough to eliminate group inequality. First, the consideration of the opportunity costs of investing in skill acquisition in our framework leads to the counterfactual implication that wealth inequality is likely a fraction of income inequality: according to Inequality.org, the median Black household in the US earns 27% less per year than the median white household, but the ratio of median Black wealth over median white wealth is 12.7%. This fact, which is an important limitation of our model, points to the need for substantially higher amounts of reparations. Moreover, if we relax the assumption that individuals are perfectly altruistic through their family lineage, the effectiveness of reparations becomes less plausible as time goes by. It is likely that as generations go on, the portion received from reparations declines. Since discrimination effort will not be declining, reparations might have a beneficial impact for the older generations but their efficacy will be diminishing over time. Eventually, it will run out of steam, and if discrimination effort is not properly controlled than group inequality will return. This exercise points to the importance of tackling discriminatory efforts by dominant groups. Most likely, reparations will not be enough to overcome group inequality if discriminatory efforts are not seriously addressed.

8 Conclusion

One central aspect of stratification economics is that it grounds racial inequality in group conflict and active discriminatory behavior by dominant group members. This paper is an attempt to formalize this insight and its consequences. While simple, we believe that our model can be used in order to address the issues arising with stratification-based inequality, its implications for income and wealth, and devise policies aimed at improving the position of marginalized groups.

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A Optimization

The Lagrangian for an individual in group D is:

$$\mathcal{L} = -Ah_M^{\alpha}\left[1-(\eta d_i+(1-\eta)d_{-i}\right]^{1-\alpha}+\lambda(Ah_{i,D}^{\alpha}-h_{i,D}-d_i) \tag{34}$$

and the battery of Kuhn-Tucker first-order conditions, remembering that $d \equiv \eta d_i + (1-\eta)d_{-i}$, is:

$$\begin{aligned}
\alpha A h_{i,D}^{\alpha-1} - 1 &\leq 0 \\
h_{i,D}[\alpha A h_{i,D}^{\alpha-1} - 1] &= 0 \qquad (35) \\
(1-\alpha)\eta A h_M^{\alpha}(1-d)^{-\alpha} - \lambda &\leq 0 \\
d_i[(1-\alpha)\eta A h_M^{\alpha}(1-d)^{-\alpha} - \lambda] &= 0 \qquad (36) \\
A h_{i,D}^{\alpha} - (h_{iD} + d_i) &\geq 0 \\
\lambda[A h_{i,D}^{\alpha} - (h_{i,D} + d_i)] &= 0 \qquad (37)
\end{aligned}$$

Equation (35) solves for $h_{i,D} = (\alpha A)^{\frac{1}{1-\alpha}}$, equal across all i's; using this result and the budget constraint, we can solve for d_i as per equation (9) in the text. Using the fact that $d_i = d_{-i}\,\forall i$, repeated rearrangements and substitutions result in the following solution for the Lagrange multiplier λ in terms of given variables for dominant group members:

$$\lambda = \eta\left(\frac{1-\alpha}{\alpha}\right)\left(\frac{h_M}{1-(1-\alpha)\alpha^{\frac{\alpha}{1-\alpha}}A^{\frac{1}{1-\alpha}}}\right)^{\alpha}(\alpha A)^{\frac{\eta-\alpha}{1-\alpha}} \tag{38}$$

which is strictly positive under our assumptions and therefore justifies the focus on the interior solution of the problem throughout the paper.

The solution with the government's anti-discrimination effort ε is similar and omitted.