

On the Persistence of Racial Inequality

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Abstract

A model of the 'new growth theory' type is applied to the persistence of racial income differentials in the presence of community segregation. When community human capital affects the accumulation of human capital by individuals, differences between groups can persist indefinitely, even in the absence of current discrimination. Inter-community mobility can benefit the most advantaged members of the minority, who leave behind an impoverished ghetto. Workplace integration without community integration may not lead to equality even in the long run. We examine various policies and show that a large, temporary intervention may be successful in achieving racial equality while a smaller permanent one fails.

1. Introduction

Disparity in the economic condition of black and white Americans is a persistent and central feature of U.S. history. During the century following the Civil War, the enormous gap in income between the races slowly narrowed despite overt discrimination against African-Americans in jobs and education. The early successes of the civil rights movement, culminating in the Civil Rights Act of 1964, seemed to signal a national consensus that exclusion of black workers from the mainstream of national economic life should end. The United States has now had more than 25 years of activist policy aimed at eliminating racial differences in economic opportunity. Despite substantial progress on some fronts, the expected convergence in income has not occurred, and in recent years progress towards racial equality has halted or reversed. The distribution of gains has also been the source of much concern: while there has been rapid growth of an economically successful black middle class, living conditions in some central-city ghettos have deteriorated markedly.

Economists think of discrimination as a set of legal or social restrictions on the actions of an oppressed group that prevents members from earning a competitive market return on their abilities. As these artificial barriers are lowered, we expect the standard of living of the discriminated-against group to converge rapidly with that of the general population. Historically, the experiences of immigrant groups from Europe and Asia have conformed to this informal picture, with assimilation and economic success occurring even in the presence of substantial discrimination. This has not been the experience of the early forced migrants, African-Americans. Children who were in school at the time of *Brown vs. the Board of Education* now have their own grandchildren, but median black family income is still only about 60% of median white family income.

Our view is that the source of persistence in racial differentials lies in the influence of the group on the individual, and in the forces which create segregated communities. When the 'social capital' of a community affects the accumulation of human capital by individuals, group disparities in earnings can persist indefinitely. Our intent is to represent (or perhaps, caricature) the central features of U.S. racial history and government action in a very simple model. Much of the economic intuition is drawn from 'new growth theory,' and we stress the central point made by Lucas,

...I will emphasize again and again: that human capital accumulation is a *social* activity, involving *groups* of people in a way that has no counterpart in the accumulation of physical capital.¹

The remainder of this paper consists of five sections. First, we provide some background on U.S. racial inequality and a brief survey of theory and evidence concerning human capital externalities. In Section 3 we present the basic dynamic model of human capital accumulation. The model is characterized by both dynamic externalities (the human capital of one generation contributes to the production of the next generation's human capital) and static externalities (individual productivity depends upon the skills of fellow workers). In Section 4, we apply the model to a society with two groups, in which the minority is subject to discriminatory treatment by the majority. We consider both 'oppression,' modeled as an increase in the price of human capital acquisition, and 'segregation' of communities and workplaces following a period of oppression. We find that, in a model with dynamic externalities, segregation can perpetuate indefinitely the human capital and income gap created by oppression.

In Section 5 we introduce desegregation, which occurs via the costly transition of black workers from minority to majority jobs. With heterogeneity in transition costs, those who move are those who have the most to gain from the higher returns to human capital in the majority job sector. Two cases are considered, one in which black workers who acquire majority jobs also move out of the minority community, and another in which workplace desegregation occurs while communities remain racially segregated. We find that the distinction between workplace desegregation, which has been considerable in the past few decades, and community desegregation, which has been minimal, is a very important one. The basic results are as follows:

--When workplace desegregation is accompanied by the movement of the most able out of the minority community, it reduces the average human capital of that community and leads to further out-migration. Losers from this process include not only those who are left behind, but also the marginal movers, who leave only because of the deterioration of the minority community caused by the mobility of others.

--When workplace desegregation occurs without community desegregation, the movement of black workers to majority jobs has both positive and negative effects on average human capital in the black community: the human capital of movers increases but the human capital of those who remain in the minority job sector

decreases. One possible outcome is a stable equilibrium with a permanent human capital gap between the majority and minority communities. Alternatively, there can be an unstable equilibrium, in which case a small initial gap would eventually erode while a large initial gap would move to a stable equilibrium with permanent racial inequality.

In section 6, we explore the policy implications of a model with human capital externalities. In general, policies which attempt to remediate human capital differences will be more effective than ‘reparations’ through income transfers. Also, since initial conditions matter, large temporary policies can be more effective in achieving racial equality than small permanent policies.

The model presented below is intended to be a depiction of racial inequality in the United States and not a general theory of immigrant, ethnic, or gender income differentials. Therefore, we have concentrated on features important to an understanding of persistence in black-white differentials, including the large initial gap created by a long period of oppression and pervasive community and social segregation. The overwhelming importance of racial distinctions in the United States experience as we take as *exogenous*. While we examine the dynamics of desegregation extensively, this is *not* an ‘endogenous segregation’ model. Even when we allow agents to choose their workplace, they cannot choose the community in which they acquire their human capital.²

2. Background

In the aftermath of the Civil War, about 95 percent of black adults were illiterate and black income per capita was less than one-quarter of white income.³ Northern blacks fared somewhat better than the newly-freed slaves in the South, but the gap between black and white average incomes was enormous throughout the country. During the next century, the racial income gap gradually narrowed, aided by the migration of black workers from the rural South to the industrialized North. In the South itself, change was slow and bitterly resisted; Jim Crow restrictions increased employment segregation in the early 20th century and the public schools serving blacks and whites remained separate and unequal.⁴

In the 1960’s and early 1970’s black workers, particularly the young and well-educated, experienced a sizable improvement in relative earnings, though the source of that improvement has been the subject of some

controversy. Smith and Welch [1986, 1989] emphasize the role of declining disparities in education, both in terms of years of schooling and in schooling quality. Card and Krueger [1992] attribute 15 to 20 percent of the growth in black-white relative earnings during the period 1960-1980 to gains in relative schooling quality. Others have concentrated on the demand-side effects of Federal civil rights policy, beginning with the early work of Freeman [1973] and including Donohue and Heckman [1991], who construct a picture of the rapid breakdown of racial barriers in the South due to intense Federal pressure. Between 1965 and 1975, the median earnings of a black man who worked rose from about 58 percent of white male earnings to 73 percent. The relative earnings of black women rose from 58 percent to 97 percent of white female earnings.

Beginning in the late 1970's and continuing through the 1980's, there was a cessation and in some areas a reversal of the progress made during the preceding decade. Blau and Beller [1991] find that, for black men and women, relative earnings and wages rose during the 1970's and leveled off or declined during the 1980's. Bound and Freeman [1992] further document the slippage in relative earnings for young black men. In 1976, black male wage and salary workers out of school less than ten years earned 94 percent of what a comparable white male earned. By 1989, relative earnings for the comparable group had fallen to 82 percent. Smith [1993] notes that the picture is similar for young black male college graduates, who had experienced particularly rapid increases in relative earnings during the 1970's, but whose earnings and occupational position both declined substantially during the 1980's. Other concerns include the increase in the proportion of young black men in jail or with criminal records, and the fall in employment rates among the same group. The dramatic increase in earnings achieved by black women should not be overlooked (the relative earnings of black women was still 90 percent in 1989), but for them the economic benefits of increased individual earnings since the 1960's had to be weighed against the increased probability of supporting children as a single head of household. Overall, a picture has developed over the past fifteen years of momentum lost, of progress halted with racial equality still unattained.

Why have earnings and income differentials between blacks and whites in the United States not been eliminated? A possible answer is that discrimination still inhibits the acquisition of compensable skills by blacks, or reduces the return to those skills in the labor market. The enforcement of civil rights legislation has caused employers, unions, and educational institutions to drop nearly all overt racial barriers; those that remain must exclude

or retard by more subtle means. Affirmative action was designed to compensate for these difficult-to-measure biases by focusing on the overall hiring and promotion rates of black and white workers. It has been easy, however, to label such programs 'reverse discrimination' and 'quota systems', and American public opinion has turned away from race-conscious programs. Both black and white Americans express repugnance at preferential treatment of groups [Lipset, 1991] and the political limits of government action to combat labor market discrimination may have been reached.

William Julius Wilson [1987] has asserted that "historic discrimination is more important than contemporary discrimination in understanding the plight of the black underclass." The influence of historic discrimination need not be limited to the underclass, however, and Christopher Jencks [1992] points out, in this context, that white children (including preschoolers) outperform black children on standardized tests even when parents' socioeconomic status has been controlled for. By what mechanism can past discrimination place such a heavy hand on the present generation? Jencks suggests, rather tentatively, that "we have to look at the way in which historic discrimination has shaped black families and black culture," while recognizing that this places the issue on politically-charged territory. What Jencks and Wilson call culture refers to common elements in the values and social norms of a group, and includes attitudes towards education and work, patterns of child rearing and family life, and the relative weight placed on achievement in different arenas. These attributes are likely to affect an individual's acquisition of skills and characteristics, including those which are valued and remunerated by the labor market. This stock of *compensable* factors is what economists call human capital, and the effect of one generation's human capital on the education of the next provides a vehicle for the current effects of 'historic discrimination.'

A long literature on intergenerational income mobility has concentrated on family effects, on the ability of parents to bequeath earnings ability as well as wealth to their offspring. A richer view of intergenerational effects is provided by Glenn Loury in "A Dynamic Theory of Racial Income Differences." In this model two mechanisms are operating: a child's opportunity to acquire skills depends upon both the home environment and the community environment.

The quality of home (family) environment is indexed by parental income. If there is social stratification by income, parental income may serve as a proxy for the quality of the community

environment as well. Now suppose that there is also social stratification by race. In this instance the racial composition of communities, while not necessarily completely homogeneous, will tend to be somewhat concentrated. Hence, the community environment of an individual will depend on the economic position of his or her racial group as well as that of his or her family. Here again, a history of discrimination against a particular group will impact the earning opportunity of young people in that group. (p.159)

Loury finds that, if people tend to group themselves socially along racial lines, the enforcement of equal opportunity need not eradicate racial income differentials, even in the long run.

Recent writers have rendered more concrete the notion of community effects on human capital acquisition. Most notably, Wilson has described the changed environment of the urban poor caused by the exodus of middle- and working class families who had provided 'mainstream role models' in ghetto neighborhoods:

. . . in a neighborhood with a paucity of regularly employed families and with the overwhelming majority of families having spells of long-term joblessness, people experience a social isolation that excludes them from the job network system that permeates other neighborhoods and that is so important in learning about or being recommended for jobs that become available in various parts of the city. (p. 57)

Montgomery [1990] constructs a model of the labor market in which the widespread use of employee referrals, combined with a tendency of workers to refer others within their own social network, might generate persistent inequality between groups of workers. Streufert [1991] considers via simulations the effects of social isolation (in particular, the loss of high income role models) on the schooling choices of poor youth. In these works, a notion of human capital externalities operating both within and between generations in a community has been developed. Between generations, this externality may operate through a variety of channels: investments in community organizations and public educational facilities, provision of examples of rewarding and productive work, transmission of skills, information and values, and adult maintenance of a rich and orderly environment in which learning can take place.⁵

Recently, a number of sophisticated models of income distribution characterized by human capital externalities and the socio-economic stratification of communities have appeared. In Benabou [1996] and Durlauf [1996] this stratification is endogenous; the rich wish to isolate themselves from the poor because education is a local public good and are able to do so either through zoning or housing price differentials. These are appealing models of the formation of income-stratified communities, but this sort of mechanism cannot explain the stratification by race of American communities. Residential segregation between blacks and whites in urban areas is extremely high and has remained remarkably constant for decades, showing only a modest decline by the early 1980's (Jakubs [1986]), and the extent of black-white residential segregation does not decline with education or income (Denton and Massey [1988]). Massey and Denton [1989] measure several dimensions of residential segregation and conclude that blacks experience much more extreme segregation than Hispanics. Black residents of the largest U.S. cities are very likely to live in densely settled geographic tracts with no white residents and to be adjacent to other monoracial tracts. A model of human capital acquisition inside a socially isolated minority community is more appropriate for black Americans than for other American ethnic groups.⁶

The importance of race as a determinant of economic success independent of socio-economic background measures has been extensively documented over the past few decades. An important early work is O. D. Duncan's "Inheritance of Poverty or Inheritance of Race?" [1968] in which he demonstrates that much of the black-white gap in income and occupational status cannot be explained by differences in family-of-origin characteristics. Recent studies employing much richer data on family and community characteristics have confirmed the independent effect of race on economic status (Corcoran et al. [1992]) and also show that the racial composition of the neighborhood affects future earnings even after average neighborhood income has been controlled for (Datcher [1982]). Massey, Condran, and Denton [1987] argue that racial segregation of communities is an important barrier to black social and economic mobility. Using data from Philadelphia, they show that blacks with relatively high income and education live in neighborhoods of substantially poorer quality (i.e. with high rates of poverty, dependency, crime and mortality, and poor public school environments) than do whites with similar characteristics.

We present in the next section a model of intergenerational human capital externalities closely related to the 'community effects' of Loury and the 'ethnic capital' of Borjas, in that the human capital of one generation enters the

production function for human capital of the next generation. Workplace externalities are also permitted, so that an individual's productivity may depend upon the productivity or skills of fellow workers. The mechanics of the model are based on the 'new growth models' of economic development. Lucas has argued that a successful theory of economic development must be consistent both with sustained growth and with sustained diversity of income levels between countries. In a growth model with human capital externalities, some countries can remain poor while others remain rich. This would seem to be a useful paradigm for black America and white America as well.

3. The Model

We begin with a simple overlapping generations model in which individuals live for two periods, investing in human capital in the first and earning income in the second. Individuals choose levels of consumption c_t and c_{t+1} and a level of investment, \bar{I}_t , which generates human capital, \bar{h}_{t+1} . Consumption is the numeraire, the price of investment is \bar{p} , and, for simplicity, the rate of interest and the rate of time preference are assumed to be zero. Thus the individual's problem is

$$\begin{aligned} \max_{c_t, c_{t+1}, \bar{I}_t} & u(c_t) + u(c_{t+1}) \\ \text{s. t. } & c_t + c_{t+1} + \bar{p}\bar{I}_t = \bar{y}_{t+1} \end{aligned}$$

where overscores denote the levels of variables that appear more conveniently in logs below.

Production occurs in two spheres: human capital is produced in the community during the first period, and income (output) is generated on the job during the second period. We allow human capital externalities in both spheres. Let H be the mean (log) human capital of the current generation. This level of 'social capital'⁷ affects the production functions for income of individuals in the current generation and the human capital of individuals in the next. These functions, in logs, are

$$\begin{aligned} y_{t+1} &= \phi + \gamma h_{t+1} + \alpha H_{t+1} \\ h_{t+1} &= \theta + \beta l_t + \rho H_t \end{aligned} \tag{1}$$

where ϕ and θ are the constants in the production functions. We eventually introduce heterogeneity in θ ; for the moment nothing is lost by thinking of this as a representative agent model. The productivity of human capital on the job is increasing in the skill level of fellow workers, and the productivity of investments in human capital by the young is increasing in the average human capital level of adults in the community. Social capital thus generates a dynamic externality in human capital production and a static externality in output production.

The first-order conditions are

$$u'(c_t) = u'(c_{t+1})$$

$$\frac{\partial \overline{y_{t+1}}}{\partial \overline{h_{t+1}}} \times \frac{\partial \overline{h_{t+1}}}{\partial I_t} = \bar{p} \quad (2)$$

That is, the marginal utility of consumption must be equal in the two periods, and the marginal increase in second period income generated by human capital investment must be equal to the price of that investment.

A necessary condition for a decentralized equilibrium is that the marginal private return to investment in human capital be decreasing, so that $\beta\gamma < 1$. While we assume diminishing returns to the individual, there may be decreasing/increasing aggregate returns to scale in output and human capital depending upon $\gamma + \tau < 1$ and $\beta + \rho < 1$, respectively. For the most part, we will assume constant aggregate returns to scale in the production of both output and human capital. In this case, the growth rate will be constant and shocks to human capital will have permanent effects.

Now suppose that there are two groups in the population--the majority (whites) and a minority group (blacks). Jobs and communities are segregated, but there may be spillovers from the white majority to the production of human capital in the black community, such that (1) for the minority group is replaced by

$$h_{t+1} = \theta + \beta I_t + \rho H_t + \alpha H_t^* \quad (1')$$

where H_t^* is average white human capital. This cross-effect may result from some shared educational resources or commonality in the environment in which early learning and socialization takes place. The spillover will be increasing in the amount of geographic proximity or social contact between the two groups. We assume that the white population is sufficiently large relative to the black population that we can ignore reverse spillovers.⁸ We

further assume that the relative contribution of private versus social capital is equal in the two populations, that is β and the sum $(\rho + \alpha)$ are the same for the black and white groups.

Combining (2) with (1'), we can find the solution for the individual. The general equilibrium solution of the model is found by setting $H_{t+1} = h_{t+1}$. The growth rate of average human capital, $g_{t+1} \equiv H_{t+1} - H_t$ is

$$g_{t+1} = \frac{\theta + \beta\phi + \beta \ln(\beta\gamma)}{1 - \beta(\gamma + \tau)} - \frac{\beta}{1 - \beta(\gamma + \tau)} P - \frac{1 - (\rho + \alpha + \beta(\gamma + \tau))}{1 - \beta(\gamma + \tau)} H_t + \frac{\alpha}{1 - \beta(\gamma + \tau)} (H_t^* - H_t)$$

It is convenient to describe the dynamics of the model in terms of human capital growth, as income growth is simply $(\gamma + \tau)g$.

A constant growth model requires $[(\rho + \alpha) + \beta(\gamma + \tau)] = 1$. We make the slightly stronger assumption of constant returns to scale in the production of both output and human capital, $[(\rho + \alpha) + \beta] = 1$ and $(\gamma + \tau) = 1$.

The growth rate and level of average human capital with constant returns to scale are:

$$\begin{aligned} g_{t+1} &= \frac{\theta + \beta\phi + \beta \ln(\beta\gamma)}{1 - \beta} - \frac{\beta}{1 - \beta} P_t + \frac{\alpha}{1 - \beta} (H_t^* - H_t) \text{ or} \\ H_{t+1} &= \frac{\theta + \beta\phi + \beta \ln(\beta\gamma)}{1 - \beta} - \frac{\beta}{1 - \beta} P_t + \frac{\alpha}{1 - \beta} (H_t^* - H_t) + H_t \end{aligned} \quad (3)$$

Equations (3) include a term in the human capital gap between communities. The white majority is assumed to be large, so that growth in H_t^* , g^* , can be taken as exogenous with respect to changes in black human capital. If there are spillovers ($\alpha > 0$), so that white human capital contributes to acquisition of black human capital, then in the stationary state $g = g^*$. With small α , however, convergence to the stationary-state may be very slow.⁹

This 'dynamic externality' model is a much simplified version of the 'new growth theory' models of human capital accumulation presented by, among many others, Arrow [1962], Lucas [1988], and Romer [1990].¹⁰ The essential feature of this model is a dynamic externality in human capital accumulation, $\rho > 0$. In this model, a temporary shock has a contemporaneous effect on the growth rate of human capital, the effect on the level being permanent.¹¹ We contrast this with a traditional model with no externalities, so that private return depends only on private effort, and exhibits diminishing aggregate returns. In this case, (3) can be rewritten setting the externality parameters ρ , τ and α equal to zero and $[(\rho + \alpha) + \beta(\gamma + \tau)] < 1$ (equivalently, $\beta\gamma < 1$). In this model, a temporary shock has a contemporaneous effect on human capital, after which human capital returns to its long-run level.

$$\begin{aligned}
g_{t+1} &= \frac{\theta + \beta\phi + \beta \ln(\beta\gamma)}{1 - \beta\gamma} - \frac{\beta}{1 - \beta\gamma} p_t - H_t, \text{ or} \\
H_{t+1} &= \frac{\theta + \beta\phi + \beta \ln(\beta\gamma)}{1 - \beta\gamma} - \frac{\beta}{1 - \beta\gamma} p_t
\end{aligned}
\tag{4}$$

The traditional model presents what Krugman [1987] calls the ‘homeostatic’ view. Current technology and preferences determine current human capital, with no role for historical forces. We think this is close to the general view of economists regarding racial income differences—once artificial discriminatory barriers and practices are eliminated, natural market forces should quickly move the economic status of the races toward equality. ‘Quickly’ obviously does not mean the adjustment speed that might be expected in the wheat market, but the homeostatic view without intergenerational externalities would suggest that equality should be achieved within a generation.

4. Oppression and Segregation

In this section, we represent the history of U.S. racial policy in terms of two stylized regimes, which we label *oppression* and *segregation*. *Oppression* refers to policies that raise the costs of acquiring human capital in the black community. In an historical context, the term oppression obviously describes the institution of slavery, but can also be applied to the post-Reconstruction period and the early 20th century. The methods of black oppression in the United States include the impoverishment of black public schools, exclusion from trade unions and skilled jobs, political disenfranchisement, and the failure of government to protect the lives and property of black citizens.

Oppression can be represented in the model either as a reduction in black human capital or an increase in the cost of investment, p . The two are mathematically similar in that a discrete reduction in human capital is equivalent to an increase in p over some sustained period. We consider only the latter. Consider first the case in which complete social segregation accompanies the investment disincentive, so that there are no interracial human capital spillovers. We can see from equation (3) that a one percent increase in the cost of investment lowers the growth rate by $\beta/(1-\beta)$ percent. Contrast this with the homeostatic view represented by equation (4). The initial drop in output is the same in the two models. However, in the homeostatic version there is a once and for all drop in the *level* of output but no change in the growth rate, while in the dynamic externality model an increase in the price of human capital causes a drop in the *growth rate* of human capital. As illustrated in Figure 1¹², oppression results in a continuing deterioration of black human capital relative to white human capital.¹³

Segregation refers to the maintenance of separate minority workplaces and communities by legal or social pressure, but without discriminatory human capital pricing. In the U.S. experience, segregation has implied not merely separation of the races in both jobs and community, but separation following a period of severe oppression.¹⁴ We consider a regime in which the cost of investment for the oppressed group is returned to the level enjoyed by the majority group. Under complete segregation or apartheid, the effective value of α is set to zero and the end of active oppression restores g to g^* . However, the human capital gap of the previous period is permanent, in contrast to the homeostatic model (see Figure 1). This is the legacy of past discrimination, and it is generated by the dynamic human capital externality.¹⁵

If α is positive so that segregation is incomplete, then equality will be achieved eventually.¹⁶ The magnitude of spillover effects, which can be thought of as a measure of social or community integration, is an important determinant of income convergence, and differences in the degree of social isolation may help to explain the divergent experiences of black Americans (and perhaps Native Americans as well) and many immigrant groups. Racism, which promotes community and social segregation, thus comes to play a pivotal role in the persistence of income differentials, independent of any labor market discrimination.

5. Desegregation

In recent decades, the United States has experienced considerable racial integration in the workplace, but relatively little change in patterns of residential segregation. Indexes of occupational differentiation show a remarkable decline in the dissimilarity of occupations between black and white women since 1960, and a more gradual reduction in the degree of occupational segregation between black and white men.¹⁷ In contrast, indexes of residential segregation in U.S. cities have changed very little. This pattern is consistent with the focus of federal anti-discrimination policies, which have concentrated on expanding the employment opportunities of black workers.

With a partially segregated work force, on-the-job human capital externalities, and racial differences in social capital, workers' incomes will depend on the sector in which they are employed. An individual black worker would prefer a 'good' (white) job, since her productivity will be augmented by the higher average human capital of co-workers in a traditionally white job. She would have a further incentive to acquire more human capital in response to the higher marginal return on investment in such a job.

Once we permit some mobility between black and white jobs, some change in terminology is required. A ‘white’ job may be held by whites and black movers, and will be called a ‘majority’ job; jobs traditionally held by blacks are labeled ‘minority’ jobs. We consider three cases of workplace desegregation. In the first, a black worker is permitted to acquire a ‘majority’ job upon payment of a transition cost. Those who acquire a ‘majority’ job also join the majority community. Only the most able black workers, who have the most to gain, will make the transition to a majority job. In the second case, a black worker is permitted to acquire a ‘majority’ job, but continues to be a member of the black community. In the third case, we allow costless transitions between job sectors, but retain community segregation and thus segregated human capital acquisition.

Mobility with transition costs

Suppose society permits those who pay a transition cost to move from the minority sector of the labor market to the majority sector. Black workers would prefer to hold majority jobs, since they benefit from the higher average human capital of their fellow workers through workplace externalities. However, they pay a transition cost measured as a proportional reduction in human capital. We think of this cost as arising from factors such as the time spent adapting to majority customs and language, establishing a job search network outside ones own community, and the psychic costs of harassment--real or perceived. If agents were identical, either all or none would switch sectors. At this point we introduce heterogeneity in the ability to acquire log human capital, θ , which is assumed to be distributed identically in the black and white populations. We assume that an individual i 's log transition costs (x) and ability are inversely related according to

$$x_i = \kappa - \delta\theta_i, \delta > 0$$

so that the more able experience lower proportional losses to human capital when they switch sectors.

Denote the income of a black worker who has moved to a majority job as \hat{y}_{t+1} and the income of a black worker who has remained in a minority job as \tilde{y}_{t+1} . The former will be higher than the latter for two reasons: the return to individual human capital is higher in a majority job due to social capital externalities, and, since the private return is higher, movers acquire more education than stayers. These benefits are computed along the perfect foresight path. The net increase in income for movers is:

$$\hat{y}_{t+1} - \tilde{y}_{t+1} = \gamma(\hat{h}_{t+1} - \tilde{h}_{t+1}) + \alpha(H_{t+1}^* - \tilde{H}_{t+1})$$

which after solving for the optimal investments and substituting out gives

$$\hat{y}_{t+1,i} - \tilde{y}_{t+1,i} = -\frac{\gamma}{1-\beta\gamma} x_i + \frac{\tau}{1-\beta\gamma} (H_{t+1}^* - \tilde{H}_{t+1})$$

so a particular black worker will benefit from a switch to a majority job if $x_i < \frac{\tau}{\gamma} (H_{t+1}^* - \tilde{H}_{t+1})$ or, translating from transition costs to ability and remembering that $\gamma = 1 - \tau$, if

$$\theta_i > \hat{\theta}_t = \frac{1}{\delta} \left\{ \kappa - \frac{\tau}{1-\tau} (H_{t+1}^* - \tilde{H}_{t+1}) \right\} \quad (5)$$

where $\hat{\theta}_t$ is the ability threshold for those who decided in period t to move to a majority job in period $t+1$. The proportion of black workers who acquire majority jobs depends upon the relative values of minority and majority jobs, and thus on the gap in average human capital between workers in the two sectors.¹⁸

Potential job sector mobility affects the incomes of those who remain in minority jobs. Since the most talented (in terms of ability to acquire human capital) will take majority jobs, the pool of social capital in minority jobs will fall, reducing incomes and investment incentives for those who are left behind. Because of community externalities, we also need to ask: When a black worker moves to a majority job, what happens to his or her community affiliation or social network? The answer to this question affects the human capital of subsequent generations in the minority community. We consider two important subcases.

Case 1: When a black worker gets a ‘good’ job, he or she moves out of the neighborhood and effectively joins the majority group. Majority human capital is unaffected, but social capital and educational quality in the minority community is reduced.¹⁹ This is Wilson's underclass case, in which the black middle class moves out of the ghetto.

Case 2: Communities remain segregated on a racial, rather than occupational or income, basis. Black workers may commute to a majority job, but still live in and contribute their human capital to the minority community. In this case, there will be some ‘trickle down’ effect of workplace desegregation on overall black income.

Community Mobility

Case 1, in which minority workers who move to majority jobs also become members of the majority community, is mathematically simpler, since once we calculate social capital in minority jobs, this gives us minority community social capital for the next generation. In each generation, the most able move out of minority jobs and the minority community.^{20,21}

The growth rate of minority human capital is

$$\tilde{g}_{t+1} = \frac{1}{1-\beta} E(\theta | \theta < \hat{\theta}_t) + \frac{\beta\phi + \beta \ln(\beta\gamma)}{1-\beta} - \frac{\beta}{1-\beta} p + \frac{\alpha}{1-\beta} (H_t^* - \tilde{H}_t)$$

Note that $H_{t+1}^* - \tilde{H}_{t+1} = g_{t+1}^* - \tilde{g}_{t+1} + H_t^* - \tilde{H}_t$. For simplicity let $\alpha=0$. The gap between minority and majority human capital is a function of last period's gap and of the ability truncation in the current round.

$$H_{t+1}^* - \tilde{H}_{t+1} = g_{t+1}^* - \tilde{g}_{t+1} + H_t^* - \tilde{H}_t = \frac{1}{1-\beta} [E(\theta) - E(\theta | \theta < \hat{\theta}_t)] + [H_t^* - \tilde{H}_t] \quad (6)$$

Equations (5) and (6) describe a difference equation system in $(H_{t+1}^* - \tilde{H}_{t+1}, \hat{\theta}_t)$ space.

Equation (5), the mobility condition, is a straight line with vertical intercept $\kappa \frac{1-\tau}{\tau}$ and slope $-\delta \frac{1-\tau}{\tau}$. Equation (6) describes the evolution of the human capital gap and its position depends upon the lagged gap. It is nonlinear with negative slope, flattening out along the horizontal line equaling the current human capital gap, $H_t^* - \tilde{H}_t$. If the ability distribution has an upper support, θ_{sup} , equation (6) hits $H_t^* - \tilde{H}_t$ at that upper support; otherwise, equation (6) asymptotes to $H_t^* - \tilde{H}_t$. Note that equation (6) is above $H_t^* - \tilde{H}_t$ everywhere to the left of θ_{sup} .

If ability and transition costs are strongly related, then δ is large; equation (5) is steep and strikes equation (6) from above. This is the case illustrated in Figure 2. The dynamics take one of three forms. If equation (5) strikes $H_t^* - \tilde{H}_t$ above θ_{sup} , then transition costs are too high for any worker to move and no transitions take place. If equation (5) is everywhere below equation (6), everyone moves immediately. Otherwise, every period the gap between minority human capital and majority human capital grows and $\hat{\theta}$ falls. As illustrated in Figure 3, the process continues with conditions worsening monotonically for the diminishing minority left behind. (If the ability

distribution has a lower support, then the process stops when every black worker has joined the majority group.)²² In fact, since $[E(\theta) - E(\theta | \theta < \hat{\theta})]$ is positive and growing, the rate of deterioration accelerates over time.

What can be said about the effect of desegregation on the welfare of black Americans? We can identify who gains and who loses, but have little to say about net social welfare. In addition to the usual difficulties with social welfare statements involving uncompensated interpersonal comparisons, we have here an outcome in which there is a transfer from the worse off to the better off. To discuss the effects of job sector mobility on the average income or human capital of black workers would be to make comparisons as if compensation would be made within the racial group.²³

Who gains and who loses? Black workers who stay behind are unambiguously worse off.²⁴ What about black workers who move? The most able who move are obviously better off, but the marginal black mover is worse off than in the absence of desegregation. The mobility of the most able causes a deterioration in the workplace capital in minority jobs, which makes a move to the majority advantageous for some of the less able who would otherwise have stayed.

What about later generations? If the children of those who move acquire human capital in the majority community with no further transition costs, these children are unambiguously better off. Indeed, in a model with intra-family altruism, some parents would move to their immediate loss to give their children the advantages of the majority community.-

Mobility in Workplace Only

We turn now to the case in which minority workers are able to acquire majority jobs upon payment of a transition cost, but communities remain racially segregated. With heterogeneous ability, it is the most able who take majority jobs, so that job mobility lowers average human capital in minority jobs. However, black workers with majority jobs invest in more human capital in response to the higher returns, and so tend to increase average human capital in the black community and contribute to the production of human capital for the next generation. We show that it is possible for these two effects to balance, so that the mobility process gets 'stuck' in a steady-state in which the black community has a stable mix of workers in majority and minority jobs. In this case, the black community's social capital never converges to the majority level.

Social capital in the education production function of the black community is a mixture of mover human capital and stayer human capital. Let the average human capital of black workers in minority jobs be \tilde{H} and the average human capital of black workers in majority jobs be \hat{H} . Then total social capital is

$$H_{t+1} = \tilde{H}_{t+1} F(\hat{\theta}_t) + \hat{H}_{t+1} [1 - F(\hat{\theta}_t)] \quad (7)$$

Over time, the decision to take a majority job will depend upon the relative growth rates of majority human capital (which is exogenous), and human capital in minority jobs. The latter will depend in part upon the human capital of black workers who have moved to majority jobs, since they still affect community social capital. Assuming constant returns to scale and letting $\alpha=0$, the ‘job gap’ in workplace capital is

$$H_{t+1}^* - \tilde{H}_{t+1} = \frac{1}{1-\beta} [E(\theta) - E(\theta | \theta < \hat{\theta}_t)] + [H_t^* - H_t] \quad (8)$$

Combining equations (5) and (8) gives us the threshold ability level as a function of the difference in social capital between the two communities (the ‘community gap’), so that a minority worker will move if

$$\theta_t > \hat{\theta}_t = \frac{1}{\delta} \left\{ \kappa - \frac{\tau}{1-\tau} \left(\frac{1}{1-\beta} [E(\theta) - E(\theta | \theta < \hat{\theta}_t)] + [H_t^* - H_t] \right) \right\} \quad (9)$$

Note that the relation between $\hat{\theta}_t$ and $[H_t^* - H_t]$ can be either positive or negative. It is more likely to be negative (i.e. when the community gap rises, more will move to majority jobs) when job externalities are relatively large, or when transition costs are small and elastic with respect to ability. In what follows we assume the negative relationship, which corresponds to the previous section in that an increasing gap increases outmigration.

Solving for the human capital choices of stayers and movers and using (7) we find that next period’s community gap is a function of this period’s community gap, next period’s job gap, and the average ability of those who move.

$$H_{t+1}^* - H_{t+1} = \frac{1}{1-\beta\gamma} \left\{ - \left[(\delta E(\theta | \theta > \hat{\theta}_t) - \kappa) (1 - F(\hat{\theta}_t)) \right] + \beta\tau \left[(H_{t+1}^* - \tilde{H}_{t+1}) F(\hat{\theta}_t) \right] + \rho [H_t^* - H_t] \right\} \quad (10)$$

Substituting (8) into (10) gives

$$H_{t+1}^* - H_{t+1} = \frac{1}{1-\beta\gamma} \left\{ \begin{aligned} & - \left[(\delta E(\theta | \theta > \hat{\theta}_t) - \kappa) (1 - F(\hat{\theta}_t)) \right] + \beta\tau \left[\frac{1}{1-\beta} [E(\theta) - E(\theta | \theta < \hat{\theta}_t)] F(\hat{\theta}_t) \right] \\ & + (\rho + \beta\tau \cdot F(\hat{\theta}_t)) [H_t^* - H_t] \end{aligned} \right\} \quad (11)$$

which gives next period's gap as a function of $\hat{\theta}_t$ and $[H_t^* - H_t]$. Equations (11) and (9) completely describe the motion of the system as a nonlinear difference equation system. As a useful illustrative case²⁵, suppose that ability is distributed uniformly on $[\underline{\theta}, \bar{\theta}]$. Equations (9) and (11) reduce to

$$\hat{\theta} = \frac{2\kappa(1-\tau)(1-\beta) - \tau\bar{\theta}}{2\delta(1-\tau)(1-\beta) - \tau} - \frac{2\tau(1-\beta)}{2\delta(1-\tau)(1-\beta) - \tau} [H_t^* - H_t] \quad (9')$$

$$H_{t+1}^* - H_{t+1} = -\frac{1}{1-\beta\gamma} \left(\frac{\bar{\theta} - \hat{\theta}}{\bar{\theta} - \underline{\theta}} \right) \left(\frac{\delta(\hat{\theta} + \bar{\theta})}{2} - \kappa \right) + \frac{\rho}{1-\beta\gamma} [H_t^* - H_t] + \frac{\beta\tau}{1-\beta\gamma} \left(\frac{\hat{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \right) \left(\frac{\bar{\theta} - \hat{\theta}}{2(1-\beta)} + [H_t^* - H_t] \right) \quad (11')$$

Substituting (9') into (11') yields a difference equation giving $[H_{t+1}^* - H_{t+1}]$ as a quadratic function of $[H_t^* - H_t]$ in the 'migration range' corresponding to the interval $[\underline{\theta}, \bar{\theta}]$. (Outside this range there is no marginal 'migration.' For values corresponding to $\hat{\theta} \geq \bar{\theta}$, there is no workplace mobility and the gap persists indefinitely.²⁶ For values corresponding to $\hat{\theta} < \underline{\theta}$, $[H_{t+1}^* - H_{t+1}]$ is a linear function of $[H_t^* - H_t]$ with a slope of less than one.) Figure 4 illustrates four interesting cases: the difference equation can lie above or below the 45° line or it can strike the 45° line once, from either above or below.

Line (1) on Figure 4 shows what might be called the 'optimistic' case in which complete convergence in community social capital occurs eventually. With an initial racial gap, the most able black workers will pay the transition cost and move to majority jobs. This movement reduces average human capital in minority jobs and thus the investment incentives of those who stay, but this effect is outweighed by the direct contribution of the movers to community social capital, which tends to increase the human capital of the next generation. The community gap falls, a smaller proportion of the next generation decide to move, but the gap continues to decline as long as some workplace mobility occurs. Since workplace mobility is costly and no community mobility is permitted, the final convergence is associated with a re-segregation of the workplace as the incentives to move eventually disappear. The

corresponding ‘pessimistic’ case, line (2), gives results analogous to those in the preceding section, with the gap and mobility increasing over time.

Line (3) shows a more interesting outcome in which any initial gap moves over time to a stable positive gap in which the positive and negative effects of job migrants on black social capital are just equal. If the initial gap is small, the impoverishment of minority jobs by the marginal job migrant exceeds the trickle-down effect of her direct contribution to social capital. Balance is achieved as the gap rises, the ability threshold falls and the minority job sector becomes smaller. In equilibrium, the threshold ability level is constant, the black community contains a stable mix of minority and majority job-holders, and the income disparity between the two communities remains permanent. Workplace desegregation in this case is not a substitute for community integration in leading to racial income convergence.

Finally, line (4) shows an unstable interior equilibria. Here, the size of the initial gap is the critical determinant of long-run dynamics. If the initial gap small, below the intersection with the 45° line, the gap eventually disappears. Larger initial gaps will grow with workplace mobility until all black workers have majority jobs but relatively little human capital. The final result is much like Figure 1 — even though the workplace is desegregated human capital acquisition is not and social capital in the minority and majority communities diverges. The case in which initial conditions matter provides another path for explaining the divergent experiences of immigrant groups in the United States: severe oppression may cause large human capital gaps that persist, while smaller human capital gaps erode under the same conditions.

The variety of possible dynamics produced by this model is due to the dual effects of workplace mobility on next period’s social capital. On one hand, workplace externalities in the minority job sector ensure that the departure of the most able will reduce the returns to human capital investment for those who remain. On the other hand, potential mobility to the majority job sector increases the human capital investment of those who move and thus enriches the community in which they remain. This countervailing effect is not present in the previous model, in which those who change job sectors also leave the minority community behind.

Mobility without transition costs

Suppose that workplaces are costlessly integrated but communities remain segregated. All black workers will take majority jobs and benefit immediately from higher on-the-job social capital. The benefits of integration will

increase over time, as the higher return on human capital generated by the workplace externality encourages human capital investment, and therefore raises the stock of social capital in the black community. On the other hand, the historical legacy of oppression continues to inhibit human capital acquisition in the black community. To see this, replace H_{t+1} in equation (3) with H_{t+1}^* . A bit of algebra shows

$$g_{t+1} - g^* = \frac{\beta\tau}{1-\beta\gamma} (H_t^* - H_t) \quad (12)$$

so the black growth rate remains above the majority growth rate until black human capital asymptotes to majority human capital. The more important are externalities in income production relative to externalities in education, the faster is convergence. If production externalities are negligible, incomes will never converge despite complete workplace integration, and the process will always be gradual if there is a community human capital externality ($\rho > 0 \Rightarrow \beta < 1$).

6. Integration, Compensation, and True Reparation

Our model is very stylized, but it does permit us to draw some limited conclusions regarding policies intended to move the black and white communities toward income equality. We focus on this outcome as an appropriate goal for American public policy. Since we ignore the effects of any remaining discrimination in wages or the price of education, income equality implies a restoration of equality in the human capital stock.

The first point is that the homeostatic and dynamic externality growth models have very different implications for the cost of undoing the cumulative effects of oppression. In the strict homeostatic case, the effects of oppression are not cumulative. Many years of high p can be undone by simply returning p to the majority group level. In other words, cessation of oppression will be followed shortly by black-white income equality. In contrast, under the dynamic externality view, if p has been increased by oppression by $x\%$ for y periods, then immediate convergence in income requires that p receive a subsidy of $x \times y$ percent relative to the majority group.

Since segregation plays such a crucial role in this model, it is natural to consider policies which attempt to promote integration directly. Programs directed at the workplace, such as equal-opportunity enforcement and affirmative-action programs, may be viewed as attempts to lower transition costs from the minority labor market to the majority labor market. If such measures lead to gradual occupational desegregation and community mobility of

the more able or advantaged of minority workers, they will speed up the process described above, in which the fortunes of the black middle class and the so-called underclass diverge. If communities remain segregated, successful programs of workplace-only integration may fail to eliminate the racial gap even in the long run.

It is natural then to try to increase the human capital spillovers between communities, or promote community integration. This may seem particularly attractive as educational conditions deteriorate in the minority community. Fair housing, *Brown vs. the Board of Education*, school funding equalization, busing-for-desegregation, and ‘jaw-boning’ are all suggestive of attempts to increase α in equation (2’). A positive α causes eventual convergence and an increase in α speeds convergence *ceteris paribus*. However, even the relatively low levels of α achieved to date have required substantial cost in both financial and social terms. We believe that many white Americans find efforts at community integration much less acceptable than efforts at workplace integration. This places severe political limits on the ability to increase α .

What can be accomplished by throwing money at the problem? Consider three different ways in which the majority might transfer resources to members of the black community. First, the majority might transfer lump-sum income to the minority as compensation for past oppression. Such programs have been labeled ‘reparations,’ by analogy with war reparations. The effect of an income increase, according to our model, (see the first order conditions) is to improve the welfare and consumption of recipients and to have *no effect whatsoever* on human capital investments. Compensation will therefore have no effect on closing the human capital or standard of living gap for future generations.²⁷ Realistically, some part of a lump sum transfer is likely to be spent on community goods which do enhance human capital acquisition, but ‘reparations’ are likely to be relatively ineffective at repairing the damage done by oppression and segregation to accumulated human capital.

In contrast, policies aimed at increasing human capital accumulation can be considered true reparations, since the aim is to *repair* the cumulative damage of oppression. The simplest such policy is a means-tested or geographically targeted program that acts as a wage subsidy for black workers, which is equivalent to an increase in ϕ in equation (2) and which will concomitantly increase the growth rate of minority human capital. Note, however, that if wage subsidies are restricted to minority sector jobs, migration incentives will be affected as well. Alternatively we can consider policies that focus more directly on human capital accumulation by decreasing p .

Examples include minority college scholarships, better inner city schools, better police protection, etc. It is beyond the scope of this paper to compare policies which increase individual incentives for human capital investment with those which increase the supply of public goods used in the production of human capital. The basic point is a simple one, however -- if the problem is a shortage of social capital, policy aimed at enhancing the social capital stock will be the most effective.

The effects of minority human capital subsidies will depend upon whether sizable migration to the majority community is occurring among the black middle class. Absent mobility, the effect of a human capital subsidy in the minority community is exactly the reverse of oppression — the growth rate of black human capital increases and the social capital of the two communities eventually converges. The rate of convergence will be greater if human capital spillovers from the majority community increase as well; i.e. if there is some increase in the overall level of integration between racial communities.

With costly mobility between the two communities, the effects of minority human capital subsidies are more complicated. Assume that the subsidies, such as assistance to inner-city schools or infrastructure investments, apply only to those who remain in the minority community. Suppose subsidies are initiated after human capital in the minority community has begun to decline due to migration, as illustrated in Figure 5. A reduction in the price of human capital shifts up the minority schedule and reduces its slope, as migration will occur more slowly as a result of the subsidy. Even a small subsidy will unambiguously improve conditions in the minority community relative to conditions absent a subsidy, but selective out-migration will continue as long as majority social capital remains higher than minority social capital. With a small subsidy, therefore, the decline in minority human capital will recommence, though at a slower rate as long as the subsidy is left in place. If the purpose was to arrest the deterioration of social capital in the minority community in the face of selective migration, human capital subsidies will have failed. Contrast this effect with that of a subsidy large enough to tilt the slope of the minority human capital schedule above g^* . A large subsidy can increase average minority human capital by more than migration decreases it. Therefore, conditions in the minority community will continue to improve, migration will slow, and the subsidy can be dropped when convergence is achieved.²⁸

If out-migration is an important impediment to the progress of segregated minority communities, and α is small or moderate, expenditure on the infrastructure of these communities will fail to produce convergence even though it is maintained indefinitely. A sufficiently large expenditure, however, will produce convergence in incomes and social capital after a finite transition period.

Conclusion

The continuing social and residential segregation between black and white Americans has led many observers to use the analogy of 'two nations' to describe relations between the races. Following in this vein, we employ a model of the 'new growth theory' type to analyze the persistence of black and white income differentials in this country. In this model, the average human capital or social capital of a community affects the accumulation of human capital by individuals. This dynamic externality is analogous to the neighborhood effects much discussed by poverty analysts. In this model, differences in human capital and income between groups can persist over time, even when the current generation appears to face homogeneous prices and rewards. In particular, the damage inflicted by past oppression can weigh indefinitely on future generations.

The dynamic externality model has a number of implications in this context which differ from those of a conventional model. First, it implies that group disparities need not be self-correcting and that the cessation of active discrimination does not guarantee rapid convergence in incomes. With intergenerational human capital externalities, the remedy for past discrimination must be to repair the cumulative damage that has taken place over past generations.

Second, it implies that the degree of social and community separation between the majority group and the disadvantaged minority is an important determinant of the persistence of economic disparities. If there are sizable spillovers from the social capital of the majority to the human capital investment of the minority young, such as those generated by integrated communities and educational institutions, convergence will occur much more rapidly. Allowing mobility between groups, however, can result in a transition period in which the most advantaged members of the minority benefit by joining the majority, leaving an impoverished minority community behind.

Third, it suggests that workplace integration and affirmative action are unlikely to generate rapid convergence between black and white incomes if community externalities are important. Rather, effective policies

are likely to be those that target the human capital acquisition of the disadvantaged group, such as educational subsidies or the support of strong community infrastructure. If minority communities are being impoverished by out-migration of their most successful members, then a large but temporary subsidy may be effective while a smaller but permanent one is not.

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¹ Lucas [1988], p. 19. Italics in the original.

² For general equilibrium models which do give income-based sorting equilibria, see Benabou [1993] and Durlauf [1992].

³ Higgs [1989] reports an estimate of relative black income per capita of about 24 percent in 1867.

⁴ Robert Margo [1990] has found that the racial gap in school quality in the South widened around 1900 and did not narrow until after 1940.

⁵ Direct empirical evidence for community effects on behavior and economic status is limited but growing. Case and Katz [1991] find that youth behaviors such as criminal activity, drug and alcohol use, and church and school attendance are related to analogous behaviors of both adult family members and neighborhood peers. Corcoran et al. [1990] find generally small community effects on men's earnings, except that high community welfare participation is associated with lower earnings. Recent papers by Brooks-Gunn et al. [1993] and by Clark and Wolf [1992] find strong effects of neighborhood characteristics on the behavior of white adolescents, but much weaker effects on black adolescents. Mayer [1991] reports a significant effect of average socioeconomic status in a school on dropout and teen pregnancy rates, controlling for individual socioeconomic status. Crane [1991] finds "Neighborhood effects on dropping out and teenage childbearing among both blacks and whites in 1970 were extremely large in very bad neighborhoods...."

Moving beyond a purely spatial concept of community, George Borjas [1992] explores the role of "ethnic capital" in intergenerational income mobility. He postulates that the average skills of ethnic groups have an external effect on the human capital acquisition of the next generation, and shows that ethnic differences in skills and earnings can persist indefinitely if these externalities are sufficiently strong. Using two data sets (excluding blacks and Native Americans) Borjas shows that "the skills and labor market outcomes of today's generation depend not only on the skills and labor market experiences of their parents, but also on the average skills and labor market

experiences of the ethnic group in the parent's generation.”

⁶ Benabou [1996] examines the effects of different stratification regimes, noting the possibility of exogenous sources of stratification, such as racial segregation. An application to the funding of formal education, following Glomm and Ravikumar [1992], shows that there may be some interesting intertemporal tradeoffs in comparing national, local, and private funding of education.

⁷ We use ‘social capital’ to capture the external effects of private human capital production. This is similar to Loury’s [1987] use. Coleman [1988] gives a more particular definition, “obligations and expectations, information channels, and social norms.”

⁸ We assume one-way spillovers for mathematical simplicity, despite the lack of realism. Allowing for two-way flow would open up two further areas for investigation. First, a model which recognizes that economic ability is multidimensional would generate bi-directional gross spillovers, just as there are bi-directional flows in international trade. Second, allowing spillover from the black to the white community would affect the white community’s self-interest in the welfare of the black community with corresponding political effects.

⁹ Lieberman and Fuguitt [1967] simulate the changes in black-white occupational patterns following the removal of labor market discrimination, using a model with some intergenerational inertia. Their Markov model assumes that the transition probabilities, which are derived from race-pooled data on fathers’ and sons’ occupational position and education, are identical for blacks and whites. They predict that racial parity would be achieved relatively quickly, in contrast to our results.

¹⁰ We omit any roles for physical capital and technological change. Predictions about output might be best thought of as relative to the underlying growth of the economy. Formally, and without regard to race, the “new growth theory” version predicts ongoing economic growth due to endogenous acquisition of human capital while the “homeostatic” model does not. To emphasize that we are modeling the persistence of racial differences and not growth *per se*, the figures are drawn with the same trend for the majority group in the new growth theory and homeostatic models.

¹¹ Note that there are strands of the new growth theory literature that generate ongoing growth, and therefore persistence of initial deviations in separated communities, by mechanisms other than the “Romer style”

externalities we invoke. We don't pursue these mechanisms, but see Jones and Manuelli [1990] and Rebelo [1991].

¹² The “dynamic externality” and “homeostatic” lines are drawn in Figure 1 with equal slopes. The homeostatic model doesn't generate internal growth, but of course the real economy has growth due to physical capital accumulation and technological change, both of which have been excluded from this model for simplicity. We want to draw attention to how the “dynamic externality” versus “homeostatic” assumption affects the human capital gap between groups, not to the overall growth differences between the two models.

¹³ The assumption of complete apartheid, $\alpha = 0$, is an obvious overstatement of the U.S. experience, but no issues of substance rest on whether α is literally zero or very small. If α is positive but small, the black growth rate is pulled toward the white growth rate, g^* . The smaller is α , the slower will be the convergence in growth rates and the larger the long-run gap between levels of black and white human capital remains. We can calculate the long-run gap from equation (7), since $-\beta dp + \alpha d(H_t^* - H_t)$ or $d(H_t - H_t^*)/dp = \alpha/\beta$. So in response to a one percent increase in p , the (log) ratio of black capital to white capital asymptotes to α/β percent.

¹⁴ Separation absent discrimination has no effect in this model. We assume *ab initio* that the two groups are inherently identical, and do not consider any scale effects in human capital generation related to the size of the group.

¹⁵ The result shown in Figure 2 parallels that in Borjas [1992], and — although the specifics of the models differ — the intuition is, in essence, the same. Borjas emphasizes parental purchase of human capital for children while we have individuals who live two periods and face externalities in both. These differences affect some of the later results, but an important common element, a dynamic externality in human capital acquisition, generates persistence in both models.

¹⁶ Assuming equal p , the difference equation for the human capital differential is $(H_{t+1}^* - H_{t+1}) = \frac{\rho}{1-\beta} (H_t^* - H_t)$. The equation converges iff $\left| \frac{\rho}{1-\beta} \right| < 1$. With constant returns to scale $1-\beta = \rho + \alpha$ so the condition for convergence is $\left| \frac{\rho}{1-\beta} \right| = \left| \frac{\rho}{\rho + \alpha} \right| < 1$, which holds for positive α .

¹⁷ King [1992] also shows that occupational differentiation by race was much higher for women than for men between 1940 and 1960. The dramatic decline for women represented the exit of black women from domestic service.

¹⁸ The assumption that transition costs are proportional to human capital is a significant mathematical convenience, but it is not entirely innocuous because it eliminates the role of the absolute skill level. In the model here, all that matters is the ratio of social capital between the ‘origin’ and ‘destination’ communities. For more general transition cost assumptions, origin and destination levels enter separately and not necessarily homothetically. Such a distinction may matter for comparing the black experience to that of other ethnic groups, since very low human capital in the origin community may prevent mobility by reducing the absolute level of net gains.

¹⁹ Note that we assume that blacks who join the majority henceforth contribute to black community development only insofar as $\alpha \neq 0$. This misses any contribution migrants make as role models.

²⁰ What effect does this mobility have on the distribution function for ability of the next generation in the minority community? There are two possible extreme assumptions about the ‘genetics’ of ability: that the original ability distribution replicates itself (no inheritance) and that the truncated lower tail of the distribution replicates itself (complete inheritance). The ‘inheritance assumption’ turns out not to affect the dynamics of our model. Social capital in the minority community depends only on the tail of the ability distribution below the truncation point. The truncation point moves monotonically so, while the inheritance model chosen affects the ability distribution of movers, it does not affect the distribution of stayers.

²¹ An alternative specification would allow the mobility of minority workers into a racially segregated middle-class rather than assimilation into the majority community. This may be particularly relevant for black Americans and provides another contrast to other ethnic groups for which assimilation has been a realistic option. If the black middle-class is poorer than the majority group, then this sort of ‘separate development’ results in less human capital investment.

²² Different assumptions on the ability/transition cost distribution, specifically a discontinuity in the density function, might mean that conditions deteriorate for a while and then reach a stable low level equilibrium. If δ is relatively small, then equation (8) will strike equation (9) from below and there may be multiple intersections. In these cases there are multiple dynamic equilibrium paths. all of which lead all black workers to transit to the majority; gradually in some equilibrium paths and immediately in others. (In fact, there is one multiple equilibrium case where one path involves no transits. This is the case in which the ability distribution has an upper support and

(8) strikes (9) from below once only.)

²³ Economists ought to eschew the sometimes popular notion that members of an ethnic group have a special moral obligation toward other members or, put differently, economists ought not implicitly assume that agents have a property right in the behavior of other members of their race. There is a long standing — bitter — intellectual/political debate on this topic that stretches back at least to W.E.B. Dubois and Booker T. Washington. We have nothing to contribute to the debate here, except to emphasize that economists *qua economists* have nothing *simple* to say on the subject.

²⁴ Note the analogy to the ‘brain drain’ from developing countries.

²⁵ We are grateful to Bob Solow for suggesting this as a useful simplification.

²⁶ Remember that in this section we have set $\alpha = 0$, so that we are studying only those dynamics due to worker mobility — excluding those due to direct spillovers between communities.

²⁷ This strong result is, obviously, the outcome of our strong assumptions that allow separability of the investment and consumption decisions.

²⁸ Since migration is no longer monotonic, this result requires the no inheritance ‘genetic’ assumption (see footnote 17).