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ECONOMICS OF ETHNIC DISCRIMINATION, INTEGRATION,  
AND THE DISTRIBUTION OF INCOME

Ubadigbo Okonkwo



UNIVERSITY OF WISCONSIN - MADISON

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The author is a graduate student at The University of Rochester, Rochester, New York.

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## ABSTRACT

This paper critically examines some of the better known economic models of ethnic discrimination. The focus is on the simple model of factor trade initially developed by Gary Becker and now commonly used to explain the effects of discrimination on the functional distribution of income and on the total incomes of two (black and white) trading countries. On the functional distribution of income, it is found that Becker's assumption of relative factor endowment differences is not sufficient to guarantee the pattern of factor trade on which the accepted results crucially depend. Another defect of the Becker-type approach is the partial equilibrium framework in which his analysis is cast. Using that partial equilibrium analysis it is shown that Becker's results on the effects of black retaliation on black welfare ceases to hold if it is reasonably supposed that the black community is "aware." The relevant (and more general) analysis is presented, and a new concept of an optimum amount of ethnic integration is introduced.

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I. INTRODUCTION

Discrimination, in a broad sense, can be a virtue as well as a vice. The dividing line between which discrimination society approves of and which it disapproves of is never clearly defined. The line of demarcation changes over time in each society and over space across societies. Individuals and groups of individuals spend time as well as other scarce resources to learn how to discriminate between different kinds of literature, music and art in general, and also between different kinds of ethnic (and sex) subgroups of society. The same human faculties which are cultivated to discriminate in a "positive" manner are often used to discriminate in a "negative" way.

What is "bad" about ethnic discrimination is not necessarily the fact of its occurrence, but the painful economic and other effects which its victims must suffer. These effects stand out clearly in some societies. For example, in the United States the residential segregation and housing market discrimination against nonwhites leads, on the one hand, to the ghetto and other related urban problems of inner city areas and, on the other hand, to educational segregation and discrimination which in turn affects the capacity of nonwhites to invest in themselves. South Africa provides another obvious example of overt discrimination. Its apartheid policy of separate but unequal racial development, implemented by the setting up of Bantustans, is setting the trend for future racial discord.

The concern in this paper is not to enumerate or to rank the pernicious effects of ethnic discrimination. There is no attempt to empirically measure the effects of discrimination on the distribution of income.<sup>1</sup> The object here is to theoretically examine, with a critical eye, some of the better known models of ethnic discrimination, to point out their shortcomings, and to suggest ways in which the theory can be made more general.

The literature on the economics of discrimination has developed along two main channels.<sup>2</sup> A greater part of this literature explores the effects of discrimination by different economic agents on the workings of a competitive economy. The fact that products (with the exception of personalized services) do not usually bear the ethnic label of their producer, and hence the obvious possibility of arbitrage, tends to preclude the study of discrimination in product markets. This is however not the case in factor markets, especially in labor markets. The pigmentation of a worker's skin, a common cause of discrimination, is a permanent characteristic of the worker whether he is in or out of the labor market; hence, the large number of studies of labor-market discrimination. Gary Becker's early analysis of the economic effects of labor-market discrimination has recently been the subject of extensive debate and criticism.<sup>3</sup>

The other part of the literature focuses on a two factors one commodity trade model between two (black and white) countries. These countries trade in fixed amounts only those factors of production with which they are endowed. Discrimination in this model appears as an impediment to factor trade, similar to the effect of transportation cost on the flow of commodities

in traditional trade theory. This model was used by Becker to answer two questions; first, what is the effect of discrimination on the functional distribution of income and, second, what is the effect of discrimination on the total incomes of the two countries.

We take up the first question in section II, and rigorously demonstrate Becker's results. Becker makes assumptions on relative factor endowments which are not sufficient to guarantee his results. Another defect of the Becker-type approach is that his analysis is cast in a partial equilibrium framework.

Using this partial equilibrium framework Becker analyzes the effect of discrimination on the total incomes of black and white countries. In an economy which produces only one commodity, total income is the same as total output. Discrimination, which is reflected in a suboptimal allocation of tradeable resources, must reduce the total incomes of both countries. Becker then argues that black retaliation will only be self-defeating. In section III it is shown that this argument is false if attention is focused on the welfare (rather than the total output) of the black community. A new notion of the optimal amount of ethnic integration is also introduced.

## II. THE FUNCTIONAL DISTRIBUTION OF INCOME: A TRADE MODEL

Suppose white capitalists discriminate against blacks: what is the incidence of discrimination on the returns to black and white factors of production? What are the effects of white capitalist discrimination on the functional distribution of income? Who gains and who loses when there is discrimination?

In an attempt to provide an answer to this incidence question, Becker in The Economics of Discrimination introduced a simple model of factor trade between two (black and white) countries. The two countries, B and W, are initially completely segregated and economically independent. B and W are each endowed with fixed quantities of two homogeneous factors of production, labor and capital. B and W factors of production are assumed to be perfectly substitutable in production; hence, black and white labor are identical, except for differences in skin pigmentation. In each country factors of production are used in a constant returns to scale technology to produce a single commodity which acts as a numeraire and is nontraded.

Factor trade is however allowed between B and W. Assume that B is relatively labor abundant and W capital abundant in the Leontief sense.<sup>4</sup> Then make the required factor demand assumption so that when trade commences, W exports capital and imports labor from B. Let full employment, profit maximization and perfect competition prevail in all markets, except that W capitalists possess a uniform "taste" of discrimination against B factors of production. The effect of W capitalist discrimination is to impede the flow of factors so that, with discrimination, W is saddled with relatively more capital than it would have in competitive free-trade equilibrium.

The incidence question posed in the first paragraph of this section can now be more conveniently rephrased. Consider the W (or B) country. What is the effect of an increase (decrease) in its capital-labor ratio on its wage-rental ratio?

$$X = F(K,L) \quad (1)$$

where  $F$  is homogeneous of degree one in  $K$  and  $L$  (for example, constant returns to scale). Then write:

$$\frac{X}{L} = F(K/L, 1)$$

or

$$x = f(k). \quad (2)$$

Equation (2) says that the average product of labor is a function of the capital-labor ratio. The following usual restrictions are placed on the production function so that:

$$f'(k) > 0 \quad \text{if } k > 0$$

$$f''(k) < 0.$$

Under perfect competition and profit maximization, the reward to a factor is the value of its marginal product.

$$r = pf'(k) \quad (4)$$

$$w = p[f(k) - kf'(k)]. \quad (5)$$

$r$  is the rental on unit capital and  $w$  is the wage rate. The single commodity produced,  $X$ , is a numeraire whose price can be held at unity:

$$p \equiv 1.$$

The wage-rental ratio is defined as:

$$\frac{w}{r} = \frac{f(k) - kf'(k)}{f'(k)} \quad (6)$$



It is important to know the sign of  $d(w/r)/d(k)$ . Differentiating equation (6) with respect to  $k$ , and taking due account of the inequalities in equation (3), equation (7) is obtained:

$$\frac{d(w/r)}{d(k)} = \frac{f(k)f''(k)}{(f'(k))^2} > 0. \quad (7)$$

In the W country discrimination leads to  $dk > 0$ , and from equation (7),  $d(w/r) > 0$ . White labor gains and white capital loses. In the B country  $dk < 0$ , and from equation (7),  $d(w/r) < 0$ . Black labor loses and black capital gains. These same results have been reached by Becker though in a different way.

The analysis of the incidence effects of discrimination can be illustrated with the traditional demand and supply curves. This simple diagrammatic device also points out the insufficiency underlying Becker's assumed pattern of trade.

Without any loss in generality<sup>5</sup> Figure 1 illustrates only the case of trade in the interracial capital market. The fixed quantities of capital with which each country is endowed, and the varying amounts of capital demanded, are represented on each country's horizontal axis as shown in Figure 1. On the vertical axis, we have each country's rental-wage ratio. In the white country, for example, the vertical line  $E^*E^*$  represents the fixed endowment of capital and  $D^*D^*$  is the derived demand for capital in that country. Analogous definitions hold for the black country.

With free trade and no discrimination, that is at the free-trade factor price ratio  $q^1 = q^{1*}$ , the white country exports  $E^*B^*$  of capital

BLACK COUNTRY

WHITE COUNTRY

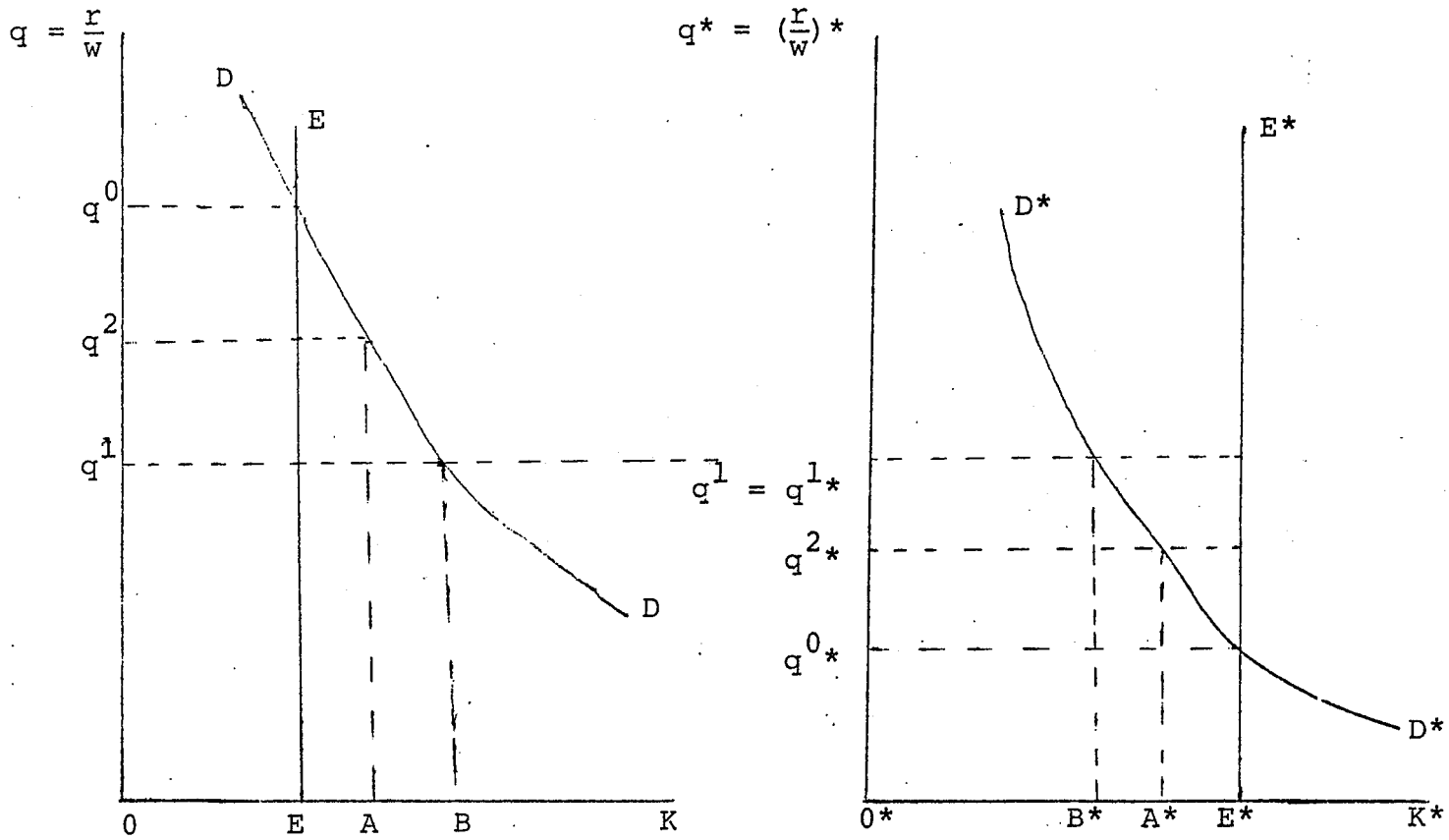


Figure 1

The case where Becker's incidence of discrimination holds.

equal to EB imported by the black country. Discrimination causes the white country to export less capital,  $E^*A^*$ , and its rental-wage ratio falls to  $q^{2*}$ . The black country correspondingly receives less white capital, EA, than the free-trade quantity and its rental-wage ratio increases from  $q^1$  to  $q^2$ . If white capitalist discrimination is sufficiently intense, all trade ceases and each country will be at its autarky point. For the black country, in Figure 1, the quantity of its capital endowment is the quantity it must use in autarky production at the rental-wage ratio given by  $q^0$ .

As Figure 1 clearly shows, the results on the incidence of discrimination critically depend on the assumed pattern of factor trade, more specifically, that W exports capital and imports labor from B. One is naturally interested in the necessary and sufficient conditions to guarantee that pattern of trade. Many economists have followed Becker in asserting that the necessary and sufficient condition for the assumed pattern of trade is that W's capital-labor ratio is greater than the ratio with which B is endowed. This assertion is false.<sup>6</sup> Becker's assumption is necessary but not sufficient to yield the pattern of trade that W exports capital. The lack of sufficiency of Becker's assumption is illustrated in Figure 2.

In Figure 2 relative factor endowments and relative quantities demanded are represented on the horizontal axis of each country. Relative factor prices are shown on the vertical axis. Assume, with Becker, that  $O^*E^* > OE$ , that is the white country's capital-labor ratio is greater than the black country's. Yet, when factor trade begins, the white country imports capital (and hence exports labor) from the black country. Note also that the

BLACK COUNTRY

WHITE COUNTRY

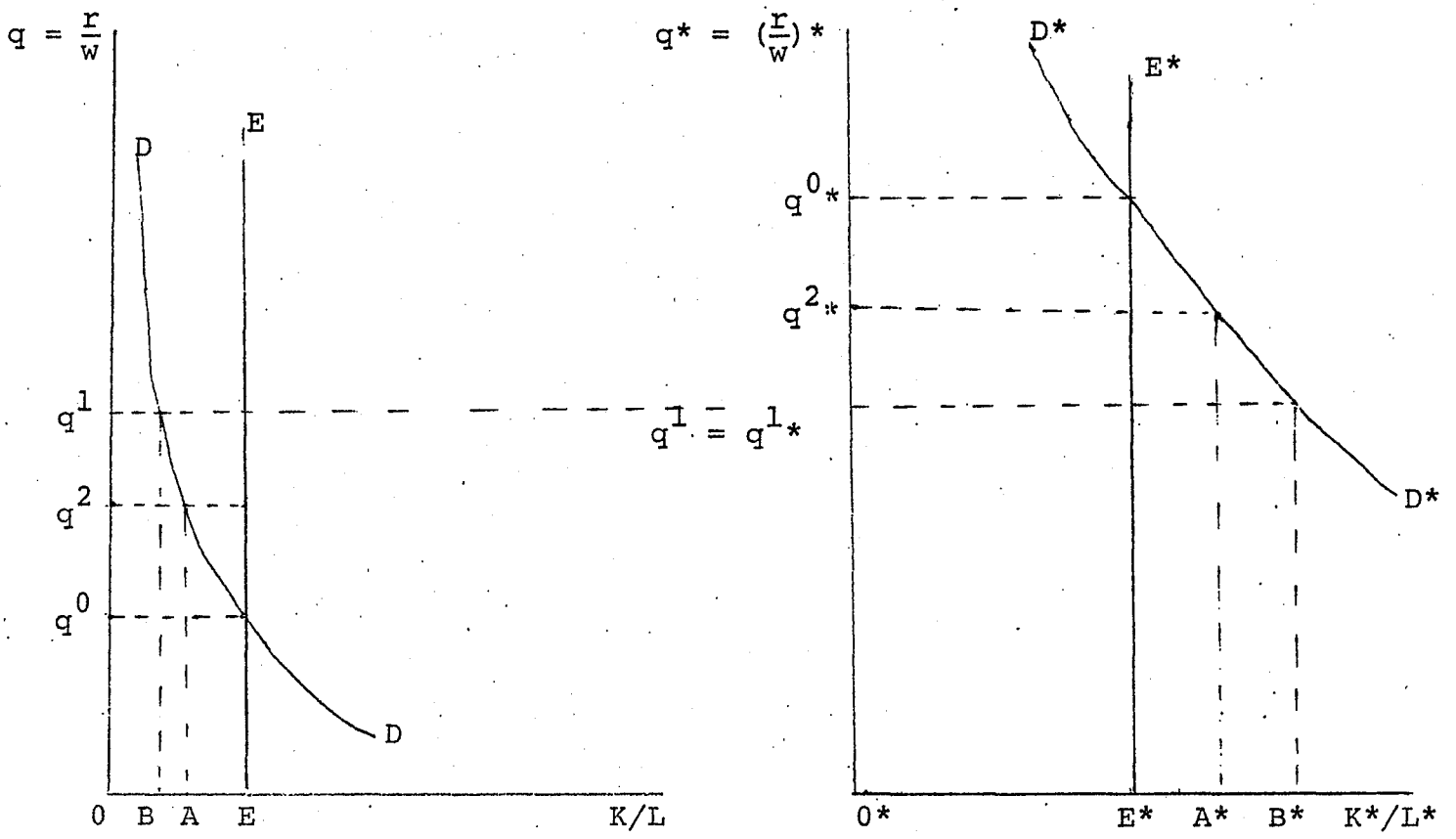


Figure 2

The perverse case.

incidence results are also reversed. With white discrimination, white capital gains and white labor loses: the opposite results hold for black factors of production.

The reason for the insufficiency of Becker's assumption should become apparent. The pattern of trade between two trading countries depends not only on the relative endowment differences but also on the relative demand differences. In Becker's book an assumption is made on relative endowment differences (the assumption that W is relatively capital abundant in the Leontief sense), to the neglect of possible opposing demand conditions. Figure 2 leads to reverse results because we assumed that relative factor demand differences overwhelm relative endowment differences. To obtain Becker's pattern of trade we need to assume that the white country's relative capital endowment superiority be more pronounced than any opposing relative capital demand differences. But this is only the Ohlin definition of factor abundance, which we state as follows:

A necessary and sufficient condition for the white country to export capital is that its pretrade rental-wage ratio be lower than the pretrade rental-wage ratio in the black country.

Recall that the demand for factors of production is derived from their use in the production process. Since only one commodity is produced in each country, we immediately note that our condition for the required pattern of trade can be rewritten as follows:

Given that the white country is relatively capital abundant, a sufficient condition for the white country to export capital is that the two (black and white) economies share the same production function.<sup>7</sup>

Given Becker's factor endowments assumption, assume now that the sufficient conditions are satisfied. Both countries share a common technology and, with trade, the black country exports labor and imports capital from the white country. Assume in each country that the cost-minimizing (or profit-maximizing) techniques are used to produce the lone commodity. We would expect changes in factor prices to move in opposite directions, but on what do these changes depend? These and other insights are gained by considering the following variant of the two factors one commodity model of production.<sup>8</sup> Consider the model for the black country.

$$a_{LX}X = \bar{L} - L_e \quad (8)$$

$$a_{KX}X = \bar{K} + K_m \quad (9)$$

$$a_{LX}w + a_{KX}r = p_X \quad (10)$$

$a_{ij}$  is the amount of input  $i$  used to produce a unit of output  $j$ . Equations (8) and (9) are the full-employment conditions of the model. Equation (8) states that the amount of labor used in  $X$  production is equal to the given endowment of black labor ( $\bar{L}$ ) less the quantity exported ( $L_e$ ). Equation (10) is the competitive profit condition. It states that the total cost of producing one unit of  $X$  equals its unit price.

To obtain an expression for the relative change of factor prices, differentiate totally equation (10). Rearranging terms and expressing variables in relative changes, we obtain

$$\theta_{LX}\hat{w} + \theta_{KX}\hat{r} = \hat{p}_X - \{\theta_{LX}\hat{a}_{LX} + \theta_{KX}\hat{a}_{KX}\} \quad (11)$$

A circumflex ( $\hat{\phantom{x}}$ ) notation over variables represents relative changes; for example  $\hat{w} = dw/w$ .  $\theta_{ij}$  is the distributive share of input  $i$  in the  $j^{\text{th}}$  industry; for example  $\theta_{LX} = w a_{LX} / p_X$  is labor's distributive share of  $X$  production.

The minimum-unit-cost condition in the  $X$  industry is geometrically shown by the tangency of a cost line and the unit product isoquant. Algebraically this condition implies that

$$\theta_{LX} \hat{a}_{LX} + \theta_{KX} \hat{a}_{KX} = 0 \quad (12)$$

Substitute equation (12) into equation (11) to obtain

$$\theta_{LX} \hat{w} + \theta_{KX} \hat{r} = \hat{p}_X. \quad (13)$$

$X$  is a numeraire good, and we can write

$$\hat{p}_X \equiv 0. \quad (14)$$

In view of equation (14), equation (13) reduces to

$$\theta_{LX} \hat{w} + \theta_{KX} \hat{r} = 0. \quad (15)$$

Finally substitute equations (8) and (9) into equation (15) to obtain

$$dw = - \frac{\bar{K} + K_m}{\bar{L} - L_e} dr. \quad (16)$$

As long as the black country does not export more labor than she is endowed with, equation (16) confirms our expectation that changes in factor prices move in opposite directions. More important, equation (16) also reveals another limitation of Becker's two factors one commodity model, a limitation more of omission than commission. From equation (16) we see that

the extent of factor price changes depends only on the relative quantities of capital to labor used in production. If we allowed a second commodity to be produced, we would expect changes in factor prices to also depend on changes in commodity prices. The effect of commodity price changes on factor price changes is not felt in this model because of the assumption that only one commodity is produced, hence equation (14). Elsewhere,<sup>9</sup> the author has attempted to generalize this partial equilibrium model by allowing the production of a second commodity. Note that any generalization in this direction is inherently more difficult when discrimination is present. Care must be exercised not only in defining discrimination but also in following through what happens to the factors of discrimination as they move across different sectors of the economy.

### III. ECONOMICS OF ETHNIC INTEGRATION

In the preceding section the incidence of discrimination on the returns to black and white factors of production were examined in the context of a simple model of trade. Using a similar model, let us now explore the effects of discrimination on the total incomes of black and white communities. We shall be particularly interested in the effects of black retaliation, or (to use a more apt phrase) the effects of black "awareness" of white discrimination on the welfare of the black community.

Consider a black economy where only one commodity is produced with the help of indigenous black and "immigrant" white factors of production. Let the commodity be a numeraire, and explicitly normalize its price to unity. National income,  $Y$ , is therefore the same as the total output of the black



community. To simplify the analysis, and to aid the reader's imagination, assume that white factors of production enter the black economy in the form of high-skilled "immigrants" with embodied amounts of human-capital investment. Each white immigrant is as uniformly skilled as any other; let the total amount imported be denoted by  $W$ .<sup>10</sup> Black factors are of two types, skilled and unskilled. Skilled blacks are of the same quality as, and perfectly substitutable with, white immigrants. Skilled factors (black and white) combine with unskilled factors (only black) in a homogeneous production process to produce the gross national income of the black country,  $Y$ .

$$Y = F(\bar{B}_u, \bar{B}_s + W).$$

$F$  is a constant returns to scale production function with positive marginal products and generalized diminishing returns. Out of  $Y$  we must deduct the income earned by white immigrants to arrive at the net national income of black citizens,  $Y^B$ .

$$Y^B = F(\bar{B}_u, B_s + W) - F_W \cdot W \quad (17)$$

$\bar{B}_u$  and  $\bar{B}_s$  are given quantities of unskilled and skilled black factors of production, respectively.  $Y^B$  therefore depends only on the varying quantities of white immigrants and can be expressed as:

$$Y^B = g(W). \quad (18)$$

Let  $g$  be continuous and twice differentiable, and let it have the following additional "well-behaved" properties:<sup>11</sup>

$$g'(W) > 0 \quad \text{for } W > 0 \quad (19)$$

$$g''(W) < 0.$$

When  $W = 0$ , no white immigrants are present and blacks must fall back on their initial pretrade resources. The autarky black national income is given by

$$\bar{Y}^B = g(0).$$

Whites are migrating to the black country in response to the higher returns existing there before trade. A free-trade equilibrium is reached when factor prices are equalized in both countries. Let the free-trade amount of white immigration be given by  $W^*$ , and the free-trade black national income by  $Y^{B*}$ . Figure 3 illustrates the discussion thus far.

In Figure 3 black national income is represented on the vertical axis and the amounts of white immigration on the horizontal axis.  $W^*$  is the free-trade quantity of white immigration. As before, let white immigrants have a uniform "taste" of discrimination against black citizens. This taste is reflected in reluctance of whites to immigrate to the black country so that, with discrimination, the free-trade level  $W^*$  becomes the upper bound of white immigration. For any level of white immigration less than  $W^*$  Figure 3 illustrates that black national income has fallen. White discrimination will therefore unambiguously reduce the total national income of black citizens.<sup>12</sup>

What are the possibilities and consequences of black retaliation? Suppose the effects of white discrimination provoke black retaliation, the important question is how will the black community retaliate? Is there only one way, or are there several?

An obvious method by which blacks can retaliate, and a way much emphasized by Becker, Roberta and Albert Wohlstetter in "Third Worlds Abroad

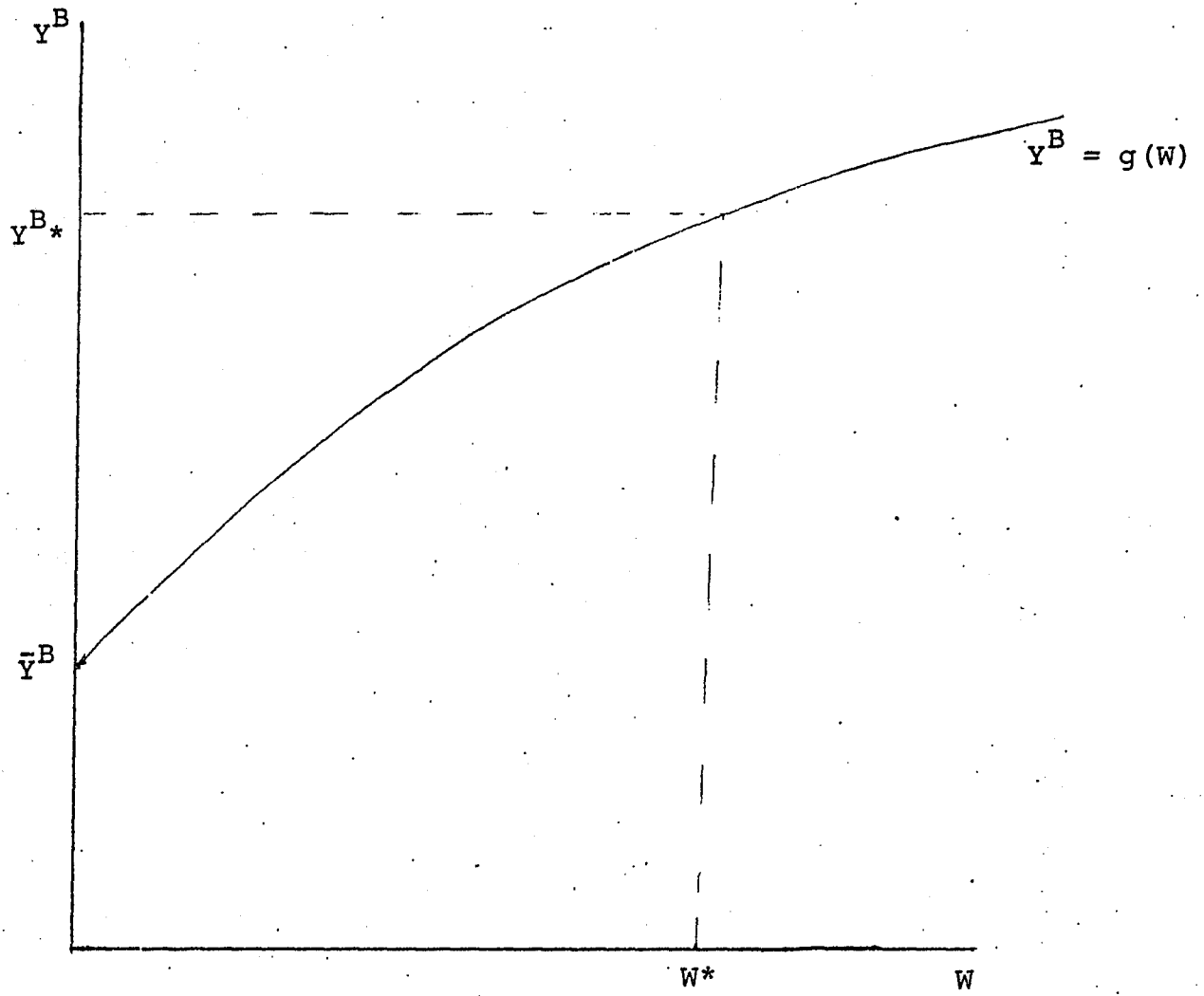


Figure 3

$W^*$  is the free-trade amount of white "immigration."

and at Home," and others, is for blacks to adopt a purely isolationist policy. Black welfare is supposed to be indifferent to the presence of white discrimination, but once their national income is reduced blacks will quickly hit back by a complete (or partial) expatriation of whites. The impact of this action on black national income is very clear from Figure 3. A total expatriation of whites will bring the black economy back to its autarky point where income is  $\bar{Y}^B$ . Becker and the Wohlstetters then allege that the actions and rhetoric of black separatists, like Marcus Garvey's "Back to Africa" movement of the 1920s, will not only be difficult to implement but will also be evidently self-defeating. To the extent that the reader allows such casual empiricism, their allegation is unfortunately based on an incomplete argument. Their argument misses one important point which is elaborated later: the national income is not identical with the social welfare of the black community, especially when discrimination is present.

A second way to view black retaliation is to draw an analogy between the economic effects of discrimination and the theory of tariffs in international trade. This analogy was initially drawn by Anne Krueger in "The Economics of Discrimination" and has also been made by Lester Thurow in Poverty and Discrimination. Krueger argues that the impact of discrimination is similar to an imposition of a tariff in trade. As Birckerdike, Mill, Edgeworth, and others have shown many years ago, a country with monopoly power in trade can maximize its real income by imposing an optimum tariff. Krueger then alleges that the black country is presumably a "small" country with no significant power to influence the course of international trade. Its

optimum tariff will be no tariff at all, and attempts to impose a retaliatory tariff will again be self-defeating.<sup>13</sup>

Two points should be remembered when considering this analogy of discrimination and tariff theory. First, it is not a valid critique of Becker's approach to discrimination. Becker's approach is based on individual choice, the "taste" for discrimination acting to discourage individual whites from engaging in trade with blacks. Inherent in Krueger's approach, however, is the notion that whites act collectively as a trade monopolist to distort free trade with blacks. While not a valid critique of Becker, Krueger's notion provides a valid alternative definition of discrimination. Second, there is a question of possible empirical validity of Krueger's allegation that the black country is "small." After a careful reading of Krueger this writer is unable to find a trace of substantive evidence to prove that the black country is "small."<sup>14</sup> Krueger's allegation seems based on presumptions, not empirical analysis; and any two individuals' presumptions might be expected to vary widely.

But there is yet a third approach to this question of black retaliation,<sup>15</sup> an approach that is adopted in the remainder of this section. This approach stems from a recognition that what is ultimately at stake is the welfare of the black community. Blacks play a double role in their economy; they are producers as well as consumers. Production is not undertaken for its own sake, but for the purpose of maximizing the welfare of the community. The presence of whites leads to two effects which may have opposite impacts on the welfare of the black community. More whites leads to more production

which increases black welfare, but more whites may also produce an external consumption diseconomy<sup>16</sup> which reduces black community welfare.

Consider a black individual. Let his utility function depend not only on his disposable income but also on the amount of white immigrants present in the community. We write

$$U^i = U^i(Y^i, W). \quad (21)$$

Following the theory of consumer behavior, assume the  $i^{\text{th}}$  black individual is never satiated; the more income he has the better off he feels. That is:

$$\frac{\partial U^i}{\partial y^i} > 0.$$

What about the sign of  $\partial U^i / \partial W$ ? Is it positive or negative? In general it can be either. Let us therefore partition the black population into two subsets, according to their reaction to whites.

If  $\frac{\partial U^i}{\partial W} < 0$ , call the  $i^{\text{th}}$  individual an "aware" black

If  $\frac{\partial U^i}{\partial W} \geq 0$ , call the  $i^{\text{th}}$  individual a "not-aware" black

Since we are concerned with a case where the black community is reacting against white discrimination, assume that the entire black population is made up of "aware" blacks or, to put it differently, that the consensus in the black community reflects "awareness" to white discrimination. We want to make enough assumptions to guarantee the existence of a well-behaved black community welfare function.<sup>17</sup> Note a black community welfare function as

$$U = U(Y^B, W) \quad (22)$$

and let

$$\frac{\partial U}{\partial Y^B} > 0, \quad \frac{\partial U}{\partial W} < 0. \quad (23)$$

Equation (22) states that black welfare depends both on its total income and on the total number of white immigrants. The inequalities in equation (22) state that black welfare increases as income increases and decreases as the number of whites increases.

The object of the black community is to maximize its welfare. Differentiate equation (22), taking due account of equation (18), to obtain

$$-\frac{\partial U/\partial W}{\partial U/\partial g} = \frac{\partial g}{\partial W}. \quad (24)$$

Equation (24) is the first order condition for a maximum black welfare, and it has the following intuitive interpretation. It states that the marginal rate of substitution of whites for income equals the marginal contribution of whites to black income. The second order conditions are met by assumption.

The number of whites for which equation (24) holds,  $W^{**}$ , gives the optimum level of white immigration. When the black community is "aware of" white discrimination, the optimum amount  $W^{**}$  need not be equivalent to the free-trade amount  $W^*$ . Define the optimum amount of ethnic integration as the ratio of  $W^{**}$  to the entire black population. Figure 4 summarizes the discussion so far.

In Figure 4,  $UU$  is a welfare function of an "aware" black community. Equation (24) is satisfied at  $C$  where the optimum amount of white immigration is given by  $OW^{**}$ . As Figure 4 is drawn, the free-trade amount of white

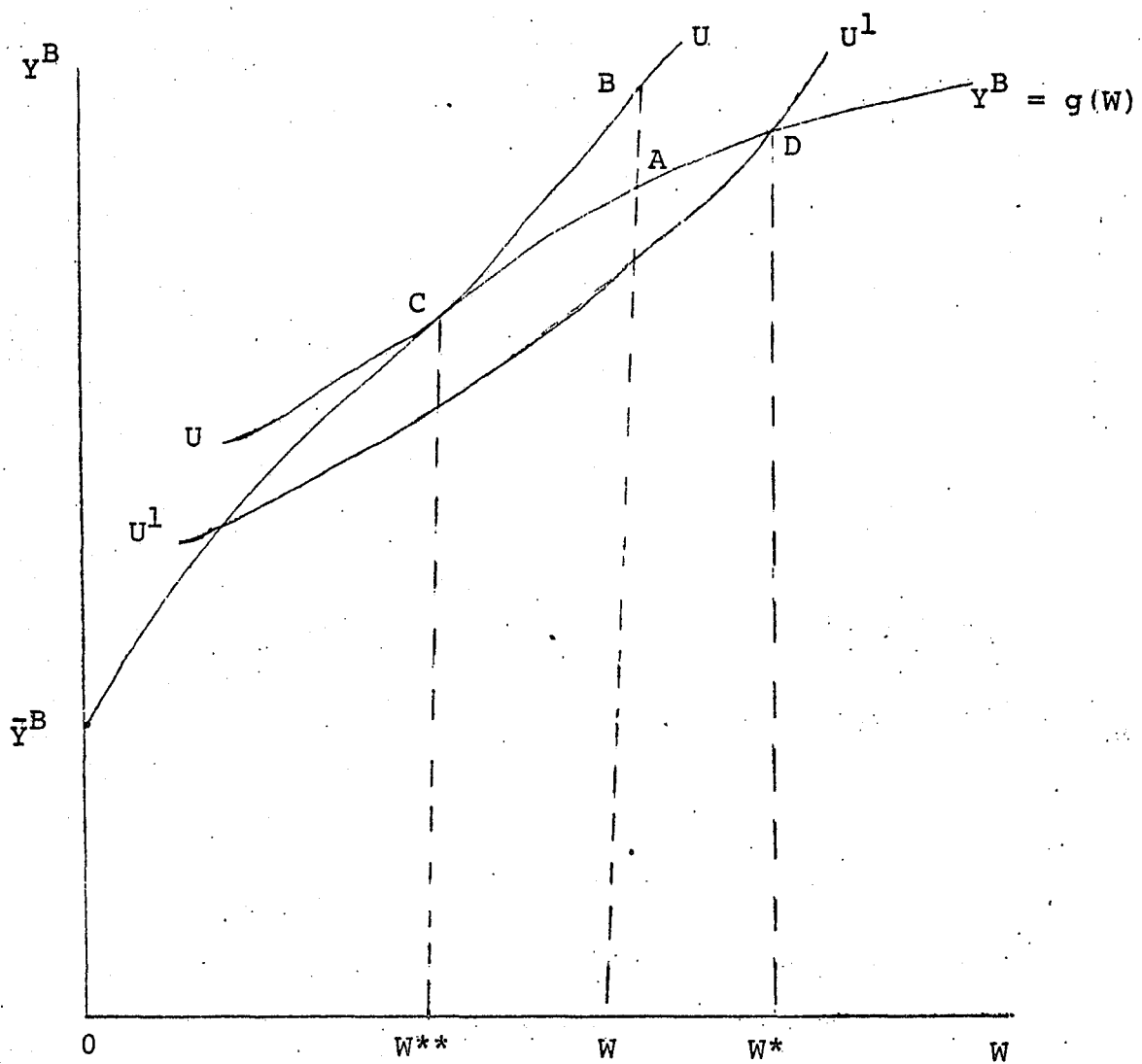


Figure 4

$W^{**}$  is the optimum amount of white "immigration."



immigration is suboptimal for black welfare. As discrimination by whites uniformly increases, the number of whites willing to immigrate to the black country declines. As the black community becomes increasingly "aware" of white discrimination, its welfare function shifts upward and to the left towards the vertical axis, but always maintaining the assumed curvature. It is the interaction between these two forces that yields the optimum welfare of the black community, given discrimination.

Suppose that, at a point in time, the black welfare function is given by the map shown in Figure 4, where optimum black welfare is achieved at C and OW\*\* is the optimum level of white immigration. Suppose that, for structural or political reasons, the number of whites present in the black community is held at OW. Then it is clear that the black community will need an income transfer<sup>18</sup> to the extent of AB to remain on their welfare optimum. AB will place the black community at the point B, which has the same welfare index as the optimum point C.

Turn next to a question we posed earlier in this paper: what is the effect of black "separation" on the welfare of the black community? Others may also prefer to ask: was Marcus Garvey right or wrong? The second question is too involved, and no easy answer is available. In any event, I do not really think economists are particularly qualified to pass judgment on Marcus Garvey's "Back to Africa" movement. The first question is more manageable. Figure 4 clearly illustrates that each of the two forces of increased white discrimination and increased black awareness will, acting independently, tend to bring the black community to its autarky point where

black national income is  $\bar{Y}^B$ . But the impact of these two forces on black welfare is different, and it is the failure to recognize this difference which makes Becker's argument incomplete. Given a black community welfare map, it is only by chance (when  $W$  is identical with  $W^{**}$ ) that increased white discrimination will lead to a black welfare optimum. However, as the black community becomes increasingly aware it will "optimally" need a declining level of white immigrants. If the black community becomes sufficiently aware, it can still achieve a corner optimum at the autarky income level  $\bar{Y}^B$ .

#### IV. CONCLUSION

Enough has perhaps been said to convince the reader that the task of rigorously analyzing the economic effects of ethnic discrimination has hardly begun. Rather than formally summarizing the contents of the previous sections in this section the author attempts to outline the promising areas of future research.

- a. In the labor market there is a need to deeply examine and formalize Kenneth Arrow's and Edmund Phelps's statistical theories of racism. Pending this analysis (and perhaps simultaneous with it) an empirical effort is required to measure the size and relationships of the effects of ethnic discrimination on the demand and supply sides of the labor market. Such an empirical analysis will enable us to distinguish, for policy purposes, the current from the cumulative effects of discrimination.
- b. On the incidence effects of discrimination, a more general equilibrium model is called for. One can imagine a model where there are three

factors (black labor, white labor and capital), but where only one pair of factors at a time is used to produce the two commodities.

This more general model will provide additional insight into existing models. For example, it will show how changes in relative factor prices are jointly determined by changes in relative factor endowments and changes in relative commodity prices.

- c. In the third section of this paper an assumption was made that the presence of discriminatory whites inflicted an extreme external diseconomy (a public bad) on a community of "aware" blacks. By aggregating over the black population we brushed aside interesting questions that arise about individual maximization when an externality (in this case an extreme externality) is present. But there is another more meaningful direction in which this model of discrimination as an externality can be generalized. The assumption that discrimination is an externality will in general cut both ways, so that blacks will appear as a public bad not only to the white immigrants but also to the citizens of the white country. This is perhaps a better approximation of situations, like that in the United States, where there is only one country albeit one inhabited by a collection of varied ethnic subgroups. Discrimination will appear to such a society as a vector of public bads. We can conceive such a bundle of commodities being produced by the friction and conflict of "values" often associated with interethnic co-existence. Questions about the optimal amounts of public bads that society will tolerate and who shall pay for them will then arise. The competitive market allocative mechanism may or may not be optimal so that it might be necessary to devise game-theoretic models of interethnic bargaining.

## FOOTNOTES

<sup>1</sup>Such empirical analysis has been done by Wohlstetter and Coleman. In Albert Wohlstetter and Sinclair Coleman, "Race Differences in Income," Racial Discrimination in Economic Life (Lexington, Massachusetts: D. C. Heath, 1972).

<sup>2</sup>This dichotomy can be traced to G. S. Becker, The Economics of Discrimination, 2nd edition (Chicago: The University of Chicago Press, 1971). Most of the book analyzes the economic effects of discrimination in the labor market. Chapter 2 dwells on the model of interracial factor trade. All references to Becker are taken from the second edition of The Economics of Discrimination.

<sup>3</sup>Most of the recent theoretical contributions in labor-market discrimination can be found in a Rand study edited by Anthony H. Pascal. In Edmund S. Phelps, "The Statistical Theory of Racism and Sexism," American Economic Review 62 (September 1972). Of special note are the papers by K. J. Arrow and John J. McCall. See K. J. Arrow, "Models of Job Discrimination," a Rand research memorandum published as chapters 2 and 6 in Pascal, Racial Discrimination and John J. McCall, "Racial Discrimination in the Job Market: The Role of Information and Search," in Pascal, Racial Discrimination. McCall applies the job-search theory of the labor market to analyze the effects of employer and employee discrimination. Arrow, among other results, mathematically confirms what was already implicit in Becker, The Economics of Discrimination, that a non-uniform "taste" of employer discrimination will in the long run lead to no market discrimination. In an attempt to correct and generalize Becker's analysis he introduced what Phelps has called the statistical theory of racism. In Edmund S. Phelps, "The Statistical Theory of Racism and Sexism," American Economic Review 62 (September 1972). A white employer may have a relatively small subjective probability that a black worker is qualified, which qualification the employer cannot verify if the worker is not actually employed. Acquisition of this qualification is not costless to the worker, and the employer is also assumed to incur the cost of firm-specific investment (like hiring costs) when the worker is employed. A differential payment to black and white workers is shown to arise from firms' attempts to maximize their expected profits. These models are being tentatively put forward. But as they stand at present, we are not told why employers always expect blacks to be relatively unqualified. Also factors arising from the demand and supply sides of the labor market are not adequately specified, as are the differential impact of current and cumulative discrimination. Other recent empirical contributions to the literature on labor-market discrimination are Barbara R. Bergmann, "The Effects on White Incomes of Discrimination in Employment," Journal of Political Economy 79 (March/April 1971) and O. Ashenfelter, "Racial Discrimination and Trade Unionism," Journal of Political Economy 80 (May/June 1972).

<sup>4</sup>This is Becker's assumption of relative factor endowment differences. W is capital abundant in the Leontief sense if and only if it is endowed with a higher ratio of capital to labor than B. As will be shown later, this assumption is not sufficient to guarantee the pattern of trade on which Becker's results depend. R. W. Jones, in "Factor Proportions and the Heckscher-Ohlin Theorem," Review of Economic Studies 24(October 1956), has distinguished the Leontief definition of factor abundance from that due to Ohlin. W is capital abundant in the Ohlin sense if and only if its pretrade rental-wage ratio is less than that in B.

<sup>5</sup>Since only two factors are involved in trade, we really have one independent factor market where labor is exchanged for capital. If the budget constraints in the two countries are satisfied, equilibrium in the capital market necessarily implies equilibrium in the labor market.

<sup>6</sup>This error is not very important in itself, but it is one into which many economists have carelessly fallen. The following are some of the places in the literature where the insufficient assumption appears: G. S. Becker, The Economics of Discrimination, p. 26, n. 12; Ibid., p. 27 and p. 28, n. 15; L. C. Thurow, Poverty and Discrimination (Washington, D.C.: The Brookings Institution, 1969), p. 112; and Albert Wohlstetter and Roberta Wohlstetter, "'Third Worlds' Abroad and at Home," Public Interest (Winter 1969), p. 89. The latter two are cases of an uncritical adoption of Becker's assumption.

<sup>7</sup>In Becker, The Economics of Discrimination, p. 33, W and B (which, in Becker's notation, is denoted by N) are assumed to possess different production functions. Later on (see p. 35) the production functions of W and B are allowed to be identical, as a simplifying assumption. Our condition asserts that the assumption of a common technology is indeed sufficient to yield the required pattern of trade.

<sup>8</sup>This variant of the two factors one commodity model of production is suggested by R. W. Jones in "The Structure of Simple General Equilibrium Models," Journal of Political Economy 73(December 1965), where the more general two factors two commodities Heckscher-Ohlin model is analyzed.

<sup>9</sup>See Ubadigbo Okonkwo, "The Distribution of Income in an Economy Where Discrimination is Present," unpublished (The University of Rochester, July 1972).

<sup>10</sup>Following Becker, The Economics of Discrimination, and Anne O. Krueger, "The Economics of Discrimination," Journal of Political Economy 71(October 1965), we explicitly consider the case where only white capital movement is allowed to affect total incomes. The reader should nevertheless bear in mind that trade is in essence a matter of bilateral exchange and, in this model of factor trade, black labor will also be exported to the white country to help equalize factor prices.

<sup>11</sup>Becker has indeed shown that the properties of  $g$  shown in equation (19) follow from the "well-behavedness" of  $F$ . See Becker, The Economics of Discrimination, pp. 34-36.

<sup>12</sup>What about the national income of the white country? In balance of payments equilibrium, white discrimination will also result in a lower (than free trade) level of black immigration to the white country. Hence, white discrimination also reduces the national income of the white country.

<sup>13</sup>For the white country, Krueger's argument goes something like this: the white country presumably has monopoly power in trade and white capitalists, acting in a fiduciary role, can impose an optimum tariff to maximize the real income of the entire white country.

<sup>14</sup>There is, to be sure, some evidence in Krueger, "Economics of Discrimination," but it is unfortunately not substantive, and for two reasons: First, Krueger's empirical report, by relying on the United States situation, yielded to the strong temptation of viewing the U.S. black community as constituting a separate, and perhaps "colonized," entity engaged in trade with the dominant "metropolitan" white country. The dangers attendant on this analogy and an attempt at a constructive reformulation can be found in Donald J. Harris, "The Black Ghetto as 'Internal Colony': A Theoretical Critique and Alternative Formulation," The Review of Black Political Economy 2, No. 4 (summer, 1972). Given the highly artificial nature of this trade model, and this is our second point, the values Krueger chose for the parameters are only intended to be illustrative and hypothetical.

<sup>15</sup>That Becker, for example, did not perceive this approach to black retaliation can easily be seen in the following excerpt from Becker, The Economics of Discrimination, p. 32. Minority groups are often tempted to "retaliate" against discrimination from others by returning the discrimination. This is a mistake, since effective economic discrimination occurs against them not because of the distribution of tastes but because of the distribution of resources." This may be so, but need blacks (a minority group) be indifferent to the presence of discriminating whites? The quotation further reveals Becker's preoccupation with total output to the neglect of the effect of discrimination on the social welfare of the minority group.

<sup>16</sup>This is not the first place where the notion that discrimination operates as an external diseconomy has been used. Finis Welch, in "Labor Market Discrimination: An Interpretation of Income Differences in the Rural South," analyzed the case of an external production diseconomy. In that model an external production diseconomy is generated within an integrated work force of an otherwise competitive firm. In our model, the external diseconomy appears as a "public bad" adversely affecting the welfare of the entire black community.

Our assumption that white discrimination affects blacks as a consumption externality is also implicit in Frank G. Davis, The Economics of Black Community Development (Chicago: Markham Publishing Company, 1972), and Stokely Carmichael and Charles V. Hamilton, Black Power: the Politics of Liberation in America (New York: Random House, 1967).

<sup>17</sup>The existence of such a black community welfare function may be compatible with varying degrees of black "awareness" over the citizens of the black country. The community welfare function reflects the ethical valuation of the society as a whole. Furthermore, from equations (21) and (22) it is apparent that the presence of whites is a "public bad" for the black community; the same number of whites is present in the utility function of each individual black and in the welfare function of the entire black community. In this paper we are focusing on the reaction of the entire black community to white discrimination, and we therefore sidestep other interesting questions that arise (for individuals and for society) when public bads are present.

<sup>18</sup>This suggestion that blacks may need an income transfer to keep them at their welfare optimum catches, in some sense, the spirit behind Browne's plea for reparations to black America. See Robert Browne, "The Economic Case for Reparation to Black America," American Economic Review (May 1972). Admittedly, Browne and others are concerned with the more thorny problem of estimating the actual transfer of wealth and income from black to white America over the centuries of slavery and subsequent discrimination. It is this sum they demand should be repaid to the present and future generations of blacks.

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