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Occupational Segregation, Wages and Profits When Employers Discriminate by Race or Sex*
BARBARA B. BERGMANN

There are two phenomena associated with employment discrimination against blacks: (1) blacks are distributed among occupations differently from whites, even after differences in education are accounted for, and (2) within occupations whites earn more than blacks do. The same two phenomena are observed as between men and women. It has been customary to analyze the occupational and wage aspects of discrimination as if they were logically separable and their effects additive. In this paper the two aspects are treated in a unified way, through the development of a model which marries the wage differential approach of Becker [1] to the approach emphasizing the "crowding" effects of occupational segregation originally noticed by Edgeworth [3] and developed by Bergmann [5]. The result allows a clearer view of the distributive effects of employment discrimination.

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1Professor of Economics at the University of Maryland

2A useful example is Thiroux, [8, Chapter VII]
between white and black workers. For our current purposes it is simplest initially to specify this crucial differential as a fixed money amount which does not differ from one employer to another, although it does differ for each occupation. We would expect it to be high for occupations to which for some reason prestige attaches and low and possibly zero or negative for occupations considered menial.

Segregation of the two occupations is stable if

\[ d_x \leq (\text{prestige marginal productivity}) - (\text{menial marginal productivity}) \leq d_y \]

where \( d_x \) and \( d_y \) are the crucial differentials in the menial and prestige occupations respectively. If the difference in the marginal productivities becomes greater than \( d_x \), we would expect some black workers to be able to move to the prestige occupation as shown in Figure I. We may think of certain firms switching from white to black crews in the prestige occupation so as to employ the

\[ BS = BH = KG \]

black workers whom we have assumed to have moved over from the menial occupation. As a result of the reduced concentration of blacks in the menial occupation, productivity and the wage level there has risen to \( SF \), and this is the wage we would expect black workers to earn in the prestige occupation, since it is their opportunity cost when leaving the menial occupation.\(^4\)

We may generalize this point by drawing a "supply curve" (line \( NK \)) of black workers to the prestige occupation. It is convenient to draw this curve so that the quantity of black workers supplied to the prestige occupation at each wage is measured leftward from the marginal productivity curve of the prestige occupation. The position of this supply curve (which is linear) depends on the positions of the marginal productivity curves in the two occupations and on the total number of blacks in the labor market. The wage at point \( N \) is the wage below which no black workers will come to work in the prestige occupation and is, of course, that wage which black crews can earn if all of them are crowded into the menial occupation. The slope of the supply curve through \( N \) depends on the slopes of the two marginal productivity curves.\(^5\)

How does this assumed move of black workers to the prestige occupation affect white wages? In order to answer this question, we must recall that the marginal productivity curve in any occupation is derived by lateral summation from the marginal productivity curves of each of the firms for this kind of labor. If certain firms swing over to hiring black labor for the prestige occupation, then the new demand curve for white labor in that occupation will be lateral summation of the marginal productivity curves of the remaining firms. In Figure II this new demand curve has been drawn as \( AK \), on the assumption that KG black workers have entered the prestige occupation and all firms have linear marginal productivity curves which cross the axes at \( A \) for the prestige occupation. In this case, the wage rate of white workers must fall from \( DF \) to \( DM \). Figure II displays the range of possibilities when \( d_y \) is allowed to vary between zero and plus infinity and \( d_x \) is assumed to be zero. As before, the supply curve of Negroes to the prestige occupation is \( NK \), which crosses the total supply curve of white workers at \( P \). This point on the supply curve will be realized if \( d_y \) is zero. In that case, the wage of white workers and black workers in both occupations will be \( DE \), and the segregation of black workers in the menial occupation will presumably have no further rationale.\(^6\)

The other extreme is, of course, the realization of point \( N \), which we have already discussed and which occurs when \( d_y \geq EQ \). A movement from \( N \) to an intermediate position, such as \( K \), means a lowering in \( d_y \) from some indeterminately large amount (below \( FN \) or below \( EQ \)) to an amount equal to \( LM \). This is accomplished through a rise in the wages of all black workers by an amount \( 2L \) and a fall in the wages of white workers by \( EM \).

As we have drawn the curves, the fall in the wages of white workers is smaller in absolute value than the rise in the wages of blacks, but this is clearly not the only possibility. The situation in our diagrams is drawn to represent roughly the racial situation in the United States, where the number of black workers is small relative to the number of whites, and where whites are assigned to a relatively broad range of occupations and blacks to a relatively narrow range, (i.e., where there are many occupations where the \( d \)'s are positive and large, and few occupations where they are zero). In a country like South Africa, where the discriminated-against races constitute more than 60 per cent of the urban population, and where whites thus have reserved for them a relatively narrower range of occupations, a reduction in the 5-to-1 white to non-white income ratio might cause greater wage reduction for whites than wage rise for non-whites.\(^7\) Similarly if we consider sex discrimination in the United States, where occupa-
ional segregation by sex is extreme and the gap in wages between white women and white men is greater than the gap between white men and black men, a reduction in discrimination entailing a desegregation of occupations might very well result in a wage level reduction for men of a larger magnitude than the rise in wage levels for women. This is particularly true if the already large female labor force were to be augmented to any large degree by women who had previously been kept out of the labor market because of dis-
cussed notions about women's proper role and because of the low pay and tedious nature of the jobs previously open to women.

We may remark at this point that there may exist crucial differentials which are not en-

couned in the data for any particular period. For example, where the desegregated occupa-
tion has zero crucial differential, whites and blacks will have the same wage in the entire economy, despite the fact that there is a seg-

甬ated occupation in which whites may be greatly preferred. Obviously a change in the

classic composition of the population or a change in the marginal productivity curves

may in such a case create a wage gap between blacks and whites where none existed before

without any change in the degree of racism. This consideration would tend to argue that

the changes in the distribution of races and the sexes among occupations (correcting for educational differentials) is at least as impor-

ificant an indicator of genuine progress towards a color-blind and unisex economy as changes in the black-white or the male-female in-

comes gap.

Occupational Segregation

The analysis of the last section can be sum-

panied by a simple algorithm for determin-

ing the distribution of whites and blacks be-

 tween the two occupations. Given the

marginal productivity schedules, the numbers of white and black workers and the value of

the crucial differential for each occupation; we

pseudized that all whites into the occupation in

which the crucial differential is most in their

favor and blacks into the other occupation.

We then observe the difference in the mar-

ginal productivity of whites and blacks, and

depending on what that difference is we red-

istribute workers as suggested in Figure III.

<table>
<thead>
<tr>
<th>Number of an occupation</th>
<th>Number of a related occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>400</td>
<td>200</td>
</tr>
</tbody>
</table>

If desegregation takes place, the movement

of workers will be sufficient to bring the differ-

ence in the marginal productivities and the

wage rates of the two races into equality with

the crucial differential in the desegregated

occupation.

In the real world of more than two occupa-
tions, there are many occupations which are

more strict than one race-sex group, but

there still generally be more than one

integrated occupation in a typical local labor

market. Some occupations will have identical
crucial differentials attached to them. Another

reason for the multiplication of integrated
occurrences is that educational and training

differences among workers and differing pro-
duction processes among employers make for

a series of labor markets rather than a single

market in which everybody is a substitute for

everyone else in every respect but race and

sex. Of course, a factor which cuts the other

way is that workers may be forced by discrim-

ination (i.e., by very high d values) out of

the market for which they are fitted by education

and into a market which includes workers of a

lower educational level. Negro high school

graduates working as laborers and maids and

female college graduates working as typists are

the examples which come to mind.

Another reason for occupational integration

is the existence of individuals who are highly

specialized to particular occupations. Of par-

ticular interest is the white person whose tal-

ents are such that his natural niche in the

economy is in the clerical occupations, in

which the preference for white workers is

small. Paradoxically, such a white is judged by

higher preference for whites in the occupa-
tions for which he is unfit. Such preferences

increase the number of blacks in the market to

which they are low-skilled and white is restricted

and hence lowers both his wage rate and

productivity along with theirs. Blacks or

who are very highly specialized to

occupations of high prestige (by preference

rather than by inability to do anything else)

have to put up with lower income than they

might make in the lower prestige occupations

within which they would face little or no
discrimination against them. In any case,
specialization to occupations will tend to in-

crease the degree of integration.

It may be remarked here that the disad-

vantage suffered by the specialized because of

discrimination is not restricted to those who

cannot escape the occupations to which they

are specialized. Another interesting fact is that

men who by preference and talent would be

fitted to do hospital work of a professional or

technical nature below the level of physician.

Here the field has largely been preempted by

female nurses, whose number has undoubtedly

been swelled by the exclusion of women of

energy and intelligence from most managerial

posts.

As an economy with a high degree of racial or

sexual prejudice and a high degree of occu-

pational integration must be once in which

each occupation's differentials are distributed

over a range and the distributions of many

occupations overlap. It is probably correct to

throw out the single-value-of-d assumption in

occupations where a black clientele is served

separately from the white clientele or where

some workers are black (teachers, preachers,

unemployed, etc.). For most other cases, we

would argue that employers' ideas concerning

the proper occupational spheres for blacks

and women (and the financial incentive

needed to make employers go against their

notions of propriety) are probably not incomm

and unstable. If such attitudes were "bio-

logical" in this sense, we might expect consid-

erable variation from one employer to an-

other. What is more: much more likely is that

attitudes concerning which occupations are

"proper" for women and blacks are part of

the social system and are learned, and most

employers have learned pretty much the same

thing.

Measuring the degree of occupational seg-

regation is fraught with difficulties. When we

leave the theoretical realm of the simple two-

occupation model, the slippery and in-

exact nature of the concept of "occupation"

begins to give trouble. The measured degree

of segregation we find empirically will obvi-

ously depend on how we group jobs into oc-

cupations and establishments into labor mar-

kets. This means that it is more sensible to com-

pare two situations based on comparable

occupational classification than to make ab-

solute judgments about the degree of segrega-

tion in one place at one time. But even com-

parisons may be suspect and only the obvious

importance of occupational classification in

the phenomenon of discrimination makes them worthwhile.

**Discrimination and Profits**

Most previous discussion of discrimination

have been in terms of employers who won't hire

members of the discriminated-against group.

This has meant a general emphasis on the

unprofitability of discrimination to the

discriminator. The most prejudiced discrimi-

nator was pictured as precisely the one who

was thought to be raising out on the cheap-

ness of a group of laborers, a cheapness which he was creating by his own behavior. If any employers gained it was thought to be the least prejudiced. Putting the focus on occupational segregation highlights the fact that the discriminating employer does hire black men as janitors and white women in clerical capacities, while his wife hires black women as domestic servants. In fact, one characteristic of the occupations white men have chosen as "fit" for blacks and white women is that their use is not narrowly restricted to one group of employers. Whatever the profits or losses to employers from discrimination, they are fairly general throughout the system.

As the previous sections have made clear, when employers discriminate against blacks they lower the wages of blacks and raise the wages of whites. When they discriminate against women they lower the wages of women and raise the wages of men. As a result, employers may be on balance gain or lose financially. If gains are possible to employers who discriminate, all sorts of interesting possibilities are realized. For one, the inclination of employers to restrict blacks and women to jobs for which they are "fit" may have nothing at all to do with a "taste for discrimination." It may instead be adherence to an easily policable gentlemen's agreement on the part of employers whose purpose is the raising of profits. (Note that it is much easier to watch out for and put pressure on violators of "Thou shalt hire them only as janitors" than violators of "Thou shalt pay them five hours less than whites.") The crucial differential may measure the labor required to provide disincentive to the employers' group on the part of those employers who integrate a prestige occupation rather than the payment for loss of utility from working with blacks or women.8

Under what condition will discrimination make for larger profits? As we have seen, discrimination by occupational segregation generally entails differing marginal productivities by occupation. Assuming there are two occupations, and that within each labor will be paid its marginal productivity (this time with no difference in productivity or wages permitted within an occupation by race), profits (\( \Pi \)) depend on the production function (\( f \)) and its partial derivatives (\( f_s, f_l \)) and on the distribution of the fixed labor force between the two occupations (\( L_s, L_l \)).

\[
\Pi = f(L_s, L_l) - L_s f_s(L_s, L_l) - L_l f_l(L_s, L_l)
\]

Then remembering that \( \frac{dl}{ds} = -1 \), a first-order condition for profit maximization is

\[
\frac{d\Pi}{dL_s} = -L_s f_s - f_l = 0
\]

Now, the marginal productivities do not appear in this condition, so that satisfaction of the condition will not necessarily be consistent with equality of the marginal productivities of labor in both uses.9

It must also be noted that each of the two "occupations" may be a cluster of occupations grouped together, and it is employees who do the grouping. They may be able to do it in such a way as to improve their profits.

Another source of profits to discriminators would lie in racial or sexual differences in the elasticity of the supply of labor. If employers have monopsonistic power, Joan Robinson's [5] classic discussion of price discrimination would apply. Occupational segregation need not be enforced, but the difficulty of paying people in the same occupation in the same shop different wages may dictate some occupational segregation when employers play this game.

Occupational segregation affects relative prices as well as relative wages and the following model demonstrates that even where segregation lowers profits it may at the same time raise the real income of profit-takers. Consider an economy in which there are only two occupations (aside from profit-taking entrepreneurs): labor can be employed in manufacturing goods or it can be employed in the form of household servants in the households of the profit-takers. Profits from manufacturing can be expressed as

\[
\Pi = f(L_s) - f_s(L_s)
\]

where \( f \) and \( L_s \) are profits, the production function for manufactured goods and the amount of labor in manufacturing, respectively. The amount of labor is assumed fixed at \( L = L_s + L_l \).

Where \( L_s \) is the amount of labor in domestic service. It is easy to rewrite (3) so as to make \( \Pi \) a function of \( L_s \). In Figure IV the \( L_s(L_s) \) curve has been graphed, with profits measured on the "goods" axis. If profit-takers draw their servants from the labor market in the usual competitive way, they may pay there in goods an amount equivalent to the goods value of the marginal productivity of labor in manufacturing. Profit-takers will be able to consume goods (G) equal to profits less wages for servants.

\[
G = f(L_s) - L_s f_s(L_s) - L_l f_l(L_s)
\]

Equation (4) can also be written so as to make \( G \) a function of \( L_s \) and graphed in Figure IV, where it lies inside the \( L_s \) locus, which it meets at the goods axis where all profits are consumed as goods. The place on the \( G \) locus which will be selected under a regime of non-discrimination depends on the rate of preference substitution between goods and servants. Figure IV shows indifference curve I tangent to the \( G \) curve at point B, the result is different if employers all refrain from hiring same distinguishable portion of the labor force (blacks, women, Catholics) for manufacturing jobs. The supply curve of labor to the domestic service occupation becomes elastic; we show it in the diagram as a vertical line S, whose position depends on the size of the excluded group, hence assumed to be blacks. The intersection of this supply curve with the profits curve gives the amount of goods which profit-takers will receive from the manufacturing operation (OA in the diagram). The intersection of the offer curve \( O_s(L_s) \) from point A with the supply curve of servants determines the position of profit-takers under a regime of occupational segregation. In Figure IV this is point C, which may

---

8 Many readers of The Economics of Discrimination have been puzzled by Becker's formally correct analysis because of his Chicago-style use of the non-pejorative word "taste" to characterize the propensity of discrimination to act in the way they do.

9 If one turns out that if the production function is homogeneity in any degree, profit maximization and equality of the marginal productivities of the two types of labor are consistent with each other, but this is obviously not the general case.
very well be on a higher indifference curve (curve II) than the nondiscriminatory position at B.

The superiority from the point of view of the profit-takers of the discriminatory situation over the nondiscriminatory situation depends on which group the profit-takers has chosen to discriminate against. Consideration of Figure IV shows that picking on too large a group or too small a group as the target for exclusion will mean a failure to improve the position of the profit-takers over the position they could achieve in a nondiscriminatory system. If discrimination had no motive other than increasing the material welfare of the group which sets hiring policy, then whether discrimination in the form of occupational choice appeared or not would depend on the availability of a well-defined "target" group of the right size. The fact that the target groups vary greatly throughout the world in the proportion of the labor force which they constitute would argue that a de-

size to maintain a social system which subordinates women and members of certain racial and religious groups is of more importance to the decision processes which control hiring than a desire for economic advantage.

REFERENCES


The University of Chicago, which apparently represents the farthest-out western point of the intellectual territory included in the Eastern Economic Association, is well known as the home of the "Chicago School." To some at least of the members of the alleged school, the existence of the school is a sign of the establishment's ignorance and there is some reason to think that even if Chicago itself did not exist, it would be necessary for the Ivy League schools to conjure up a "Chicago School," if only to frighten the little ones into obedience as they huddle around the fireplace on those long cold nights when the Republi-

ans are in power (or only in office), and to conform their elders with the reassurance that political wisdom and social opportunism have insurmountable economic value. Be that as it may, many economists have from time to time been puzzled over what type of educational process turns clean-cut college graduates indistinguishable from others of the same ilk and age group into Chicago scholars and doctors. The process is indeed a complex one, and in the view of some former students (even successful ones) not describable without gross violation of the laws of libel and obscenity. But an important part of it is the "Core Examination," in other words: the money part of the qualifying examination for proceeding to the Ph.D.; it is so called because—and this may be the source of the dis-

tasteful characteristics of the so-called "Chicago School"—the Chicago department holds as an article of faith (or at least behaves as if it were true) that economics has a hard core of central propositions in price theory and monetary theory, which hard core the student must have digested before he can be allowed to proceed to acquire his professional doctoral qualifications. This note presents the monetary theory half of the Core Examination held in August 1973, together with notes on the answers provided by the Department member who graded the examination, for the information of readers who may be interested in knowing what goes on in a place that Carl Sandburg once called—of course, thinking of something else entirely—"hog butcher to the world." Readers of The Eastern Economic Journal may find particularly poignant the contrast between the flavor of these questions and answers, and Paul Samuelson's proof pre-

sented in the first issue of this Journal, in answer to an M.L.T. graduate micro examination question, that the landowner (capitalist) is never worth the cost of his market-organizing services to the farmers (working class).1

1 Paul A. Samuelson, "Is the Best Collector Worthly of His Full Price?" The Eastern Economic Journal, Vol. 1, No. 5 (January 1974), pp. 7-10. The problem analysis obviously confuses market efficiency with the transfer of land rent (formerly enjoyed (indirectly) by farmers to a landlord, in order to make its socially starting point. Both rent-collectors and tax-collectors pass most of the collection on to the owner. The rent-collector, as collector, will earn a wage equal to the value of his services in collecting rent, keeping the books, and so forth; this will be a deduction from the gross rent received by the landlord as owner of the land, a rent in return for which the landlord does nothing except to arrange, possibly through the collector, that the land is rented to the highest bidder. The Samuelson proof is that the gainless efficient use of labor through land-mating are not worth the transfer of all rent to the landlord—a proposition stated in this form is not surprising.