

RACIAL DISCRIMINATION AND INCOME DIFFERENTIALS AS RELATED TO EDUCATION AND AGE, 1939 TO 1967

Bruce Bosworth, St. John's University

Introduction

This paper describes an attempt to investigate an interesting social and economic hypothesis. Originally discussed in the book, The Economics of Discrimination(1), it can be stated as follows: that discrimination against nonwhites, as shown by differences in their incomes when compared to that of whites, systematically increases with the same education and age.(2) This statement implies that the gap in incomes between races widens as members of each race become more educated and grow older.

This investigation compares mean income data for white and nonwhite males within and between four time periods to determine if discrimination did in fact systematically increase with the same education and age.

The Data Used

The empirical investigation uses data from the 1940, 1950, and 1960 censuses. The 1967 income data was obtained from the Current Population Reports, and was derived by manipulation on a computer so that the data could be of the same format as the data of the other years. Table 1 shows the complete set of data used.(3)

Derivation of 1967 Mean Income Data

The mean incomes for 1967 presented in Table 1 are the result of a computer calculation performed on data in the Current Population Reports, Series P-20, No. 182, April 28, 1969, "Educational Attainment: 1968," Table 7, pp. 26-28.(4) The original form of the data was that of 40 cells for each age group and race-five income classes, by eight educational classes- the cell values were per cent by years of school completed. The total population in each income interval was also given. Conversion of this data to mean incomes for each education group was achieved by assuming that midpoints of the income class intervals were the means of the classes, and the mean of the open-end class of \$15,000 was \$25,000; then the population and per cent distributions were used as weights, so that for each education class the mean income was a weighted average calculated as follows:

Mean Income=

$$\frac{\sum(\text{Income} \times \text{Population} \times \text{Per Cent})}{\sum(\text{Population} \times \text{Per Cent})}$$

Measures of Discrimination

The mean income data in Table 1 are analyzed by using two measures of discrimination. The first measure is the "Market Discrimination Coefficient" or MDC.(5) This measure is defined as

$$\text{MDC} = \frac{Y(W)}{Y(N)} - \frac{Y_0(W)}{Y_0(N)} \quad (1)$$

where $Y(N)$ and $Y(W)$ represent the actual incomes of N and W, $Y_0(N)$ and $Y_0(W)$ represent the incomes of N and W without discrimination. If it is assumed that W and N are perfect substitutes with perfect competition in the market place, then $Y_0(W) = Y_0(N)$ and (1) reduces to

$$\text{MDC} = \frac{Y(W)}{Y(N)} - 1 = \frac{Y(W) - Y(N)}{Y(N)} \quad (2)$$

In the form given by (2), the MDC represents the percentage difference between the incomes of W(white males) and N(nonwhite males) with respect to the income of N(nonwhite males). The MDC has a range from zero or no discrimination, to values above zero representing higher levels of discrimination.

Because the MDC goes from zero upward, without a fixed upper limit, it was modified so that comparisons could be more easily made from within and between time periods being investigated. This modification is called the "Discrimination Measure" or DM.(6) This measure of discrimination is defined as

$$\text{DM} = \frac{Y(W) - Y(N)}{Y(W)} = 1 - \frac{Y(N)}{Y(W)}$$

where $Y(N)$ and $Y(W)$ are as before. The range of the DM is from zero or no discrimination, to one or complete discrimination. The DM represents the percentage difference between the incomes of W (white males) and N(nonwhite males) with respect to the incomes of W(white males).

Analysis of Mean Income Data

The analysis of the mean income data for the four time periods is based on the two measures of discrimination described above.

Discrimination Measures(DM). Table 2 presents the DM's based on the detailed levels of education that are given in Table 1. The following should be noted: (a) Males- 25 years old and over- The DM's in each year increase as education increases from less than 8 years of elementary education, where it is lowest,

TABLE 1

MEAN INCOME FOR MALES 25 YEARS OF AGE AND OVER, BY EDUCATIONAL ATTAINMENT, COLOR, AND AGE FOR
THE UNITED STATES, 1939, 1949, 1959, AND 1967

Education and Age	White Income				Nonwhite Income			
	1939	1949	1959	1967	1939	1949	1959	1967
25 years and over								
Total-All	1419	3376	6112	8902	609	1664	3260	4961
Elementary:	1125	2540	4422*	6094	566	1466	2730*	4088
Less than 8 years	NA	2234	3983	5395	NA	1386	2562	3862
8 years	NA	2875	4837	6655	NA	1909	3318	4763
High School:	1538	3586	5938*	8299	772	2133	3732*	5336
1 to 3 years	1413	3306	5555	7476	728	2030	3522	4931
4 years	1685	3840	6250	8718	859	2298	4021	5746
College:	2297	5399	9012*	12128	1064	2739	4958*	6772
1 to 3 years	1964	4501	7554	10208	948	2413	4355	6488
4 or more	2646	6250	10238	13491	1208	3177	5671	7222
25 to 44 years								
Total-All	1360	3431	6000	8781	600	1790	3367	5126
Elementary:	1058	2618	5322*	5833	555	1569	2707*	4073
Less than 8 years	NA	2316	3814	5246	NA	1492	2517	3782
8 years	NA	2890	4656	6305	NA	1915	3249	4758
High School:	1436	3425	5739*	8006	745	2145	3714*	5311
1 to 3 years	1336	3203	5351	7247	711	2037	3491	4854
4 years	1552	3607	6008	8338	816	2317	4009	5724
College:	2127	4836	8062*	11365	1016	2662	4839*	6738
1 to 3 years	1850	4159	6938	9612	903	2413	4309	6484
4 or more	2411	5512	8948	12500	1163	3032	5473	7220
45 to 64 years								
Total-All	1562	3715	6289	9050	630	1680	3102	4729
Elementary:	1235	2843	4534*	6255	590	1535	2749*	4098
Less than 8 years	NA	2537	4090	5459	NA	1458	2597	3912
8 years	NA	3185	4957	6857	NA	2027	3408	4756
High School:	1955	4176	6323*	8705	896	2222	3793*	5422
1 to 3 years	1718	3712	5860	7745	814	2137	3615	5112
4 years	2245	4702	6837	9298	1039	2365	4080	5827
College:	2921	6871	11155*	13456	1212	3094	5341*	6858
1 to 3 years	2361	5555	8755	11095	1099	2572	4495	6516
4 or more	3552	8054	13454	15429	1335	3688	6277	7265

NA: not available. *Values derived by aggregations.

TABLE 2

DISCRIMINATION MEASURES FOR MEAN INCOME OF WHITE AND NONWHITE MALES, BY EDUCATIONAL ATTAINMENT, AND AGE, FOR 1939, 1949, 1959 AND 1967

Educational Attainment and Age	1939	1949	1959	1967
25 years old & over				
Elementary:				
Less than 8 years	NA	.380	.357	.280
8 years	NA	.336	.314	.284
High School:				
1 to 3 years	.485	.386	.366	.340
4 years	.490	.402	.357	.341
College:				
1 to 3 years	.517	.464	.423	.364
4 or more	.543	.492	.446	.465
25 to 44 years				
Elementary:				
Less than 8 years	NA	.356	.340	.279
8 years	NA	.337	.304	.245
High School:				
1 to 3 years	.468	.364	.348	.330
4 years	.474	.358	.332	.314
College:				
1 to 3 years	.512	.420	.379	.325
4 or more	.518	.450	.388	.422
45 to 64 years				
Elementary:				
Less than 8 years	NA	.425	.365	.283
8 years	NA	.364	.312	.306
High School:				
1 to 3 years	.526	.424	.383	.340
4 years	.537	.498	.403	.373
College:				
1 to 3 years	.535	.537	.487	.413
4 or more	.624	.542	.533	.529

Source: Based on data from TABLE 1. NA: not available.

TABLE 3

DISCRIMINATION MEASURES AND MARKET DISCRIMINATION COEFFICIENTS, BY BROAD EDUCATION CLASSIFICATIONS, AND AGE, FOR 1939, 1949, 1959 AND 1967

Educational Attainment and Age	1939	1949	1959	1967
Discrimination Measures				
25 years old & over				
All	.571	.507	.467	.443
Elementary	.497	.423	.383	.329
High School	.498	.405	.371	.357
College	.537	.493	.450	.442
25-44 years old				
All	.559	.478	.439	.416
Elementary	.475	.401	.491	.302
High School	.481	.374	.353	.337
College	.522	.450	.400	.407
45-64 years old				
All	.597	.548	.507	.478
Elementary	.523	.460	.394	.345
High School	.542	.468	.400	.376
College	.585	.550	.521	.490
Market Discrimination Coefficients				
25 years old & over				
All	1.330	1.029	.875	.794
Elementary	.988	.733	.620	.491
High School	.992	.681	.591	.555
College	1.159	.971	.818	.791
25-44 years old				
All	1.267	.917	.782	.713
Elementary	.906	.669	.966	.432
High School	.928	.597	.545	.507
College	1.093	.817	.666	.687
45-64 years old				
All	1.479	1.211	1.027	.914
Elementary	1.093	.852	.649	.526
High School	1.182	.879	.668	.608
College	1.410	1.221	1.089	.962

Source: Based on data from TABLE 1.

to 4 or more years of college, where the DM's are highest. But, between years, within each level of educational attainment the DM's decline except in one case. The DM value in 1967 for 4 or more years of college is slightly larger than the comparable DM in 1959, but below the one in 1949. This higher value in 1967 is due to the incompleteness of the original source data.(7)

(b) Males- 25 to 44 years old- For this age group the DM's follow the patterns shown by the 25 years old and over group. That is, an increase in DM's within each year as education increases, but declines from year to year, with the highest DM's in 1939 and the lowest ones in 1967.

(c) Males- 45 to 64 years old- For this age group the DM's follow the same patterns mentioned above. Increases in the DM's within each year as education increases, and declines from year to year in each education level.

Comparison of the DM's of the two broad age groups, 25 to 44 years old, and 45 to 64 years old, shows the younger group having lower DM's than the older group. This difference suggests an increase in discrimination against nonwhite males as their age increases.

Market Discrimination Coefficients (MDC). MDC's were calculated for the same set of data as used to calculate the above DM's. The results noted for the DM's apply for the MDC's. In general, these MDC's suggest a rise in discrimination against nonwhite males within each year as education increases, with declining discrimination over time in each education level.(8)

Additional Data Analyses

The mean income data in Table 1 were analyzed by detailed education classifications as shown in Table 2. An additional analysis by major educational classifications was also carried out. That is, for those males who have completed elementary education, or high school education, or college education.

For these broad groups DM's and MDC's were calculated. The results are given in Table 3. Analysis and interpretation of these two measures gives support to findings described earlier in this paper. From Table 3 it can be seen that within each year discrimination against nonwhite males with the same education and age as white males increases. Discrimination is lowest for those with only an elementary education, and is highest for those with a college education in each year.

Figure 1 illustrates these increases within each year by the plotted DM values

for both age groups. Over time, from 1939 to 1967, the plotted DM's for the mean incomes show a decline suggesting a decrease in discrimination against nonwhite males in each education group.

Figure 2 further illustrates this decline in discrimination over time by showing the plotted DM values for each age group by their level of education.

A further suggestion of the decline in discrimination against nonwhite males over time is shown by Figure 3. The plots in this graph are based on the assumption that those males who were 25-44 years old in 1939, will be 45-64 years old in 1959. The DM values in Table 3 for these two groups are plotted in Figure 3 by level of education. Each level of education exhibits a decline over the 1939-1959 period. Also, as seen in the previous two figures, the greatest discrimination is found at the college level of education, with the lowest discrimination faced by those nonwhite males having only an elementary level of education.

Summary and Conclusions

The analyses based on DM's and MDC's calculated for mean income data of males in 1939, 1949, 1959, and 1967 showed that in these years both measures of discrimination increased within each time period as both education and age increased. But over time there were declines in these measures. These results suggest that with in each year discrimination against nonwhite males increases with their education and age. But they also suggest that over time discrimination against nonwhite males decreases with their education and age.

When the same group of men are studied in 1939 and 1959, the findings suggest that although discrimination increases with increased education, it declines with increased age. Thus, nonwhite males when compared to white males with the same education and age are faced with less discrimination as both groups get older.

With respect to the hypothesis stated earlier, if discrimination against nonwhites with regard to their education and age was systematically increasing, it was expected that the two measures of discrimination would show either stable patterns or increasing patterns over time. All of the above analyses do not show measures of discrimination that are increasing over time that would suggest systematic increases in discrimination with regard to education and age. Rather, the declines over time of the measures of discrimination suggest that discrimination against nonwhite males with the same

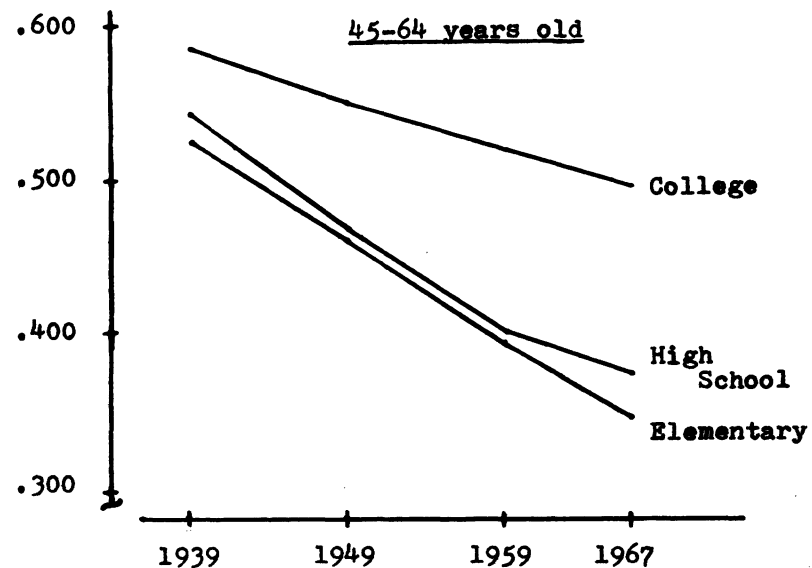
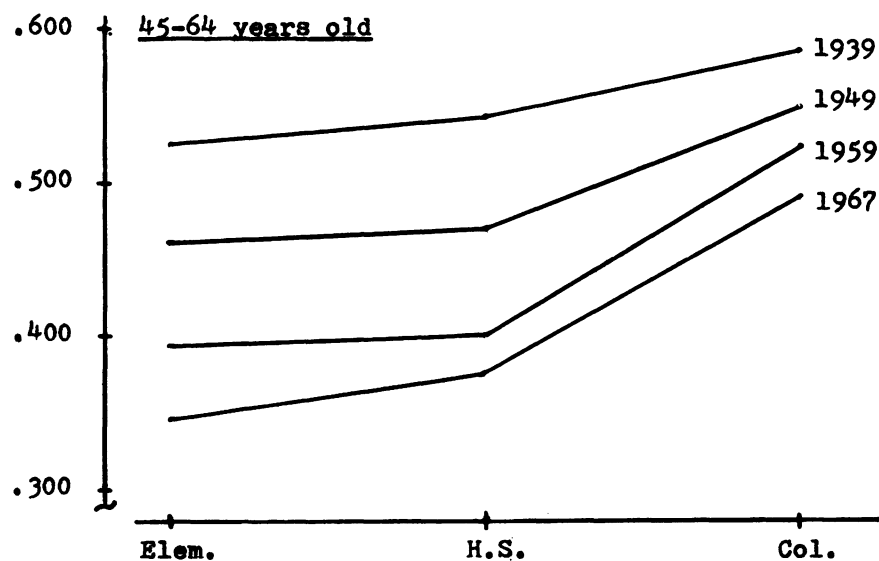
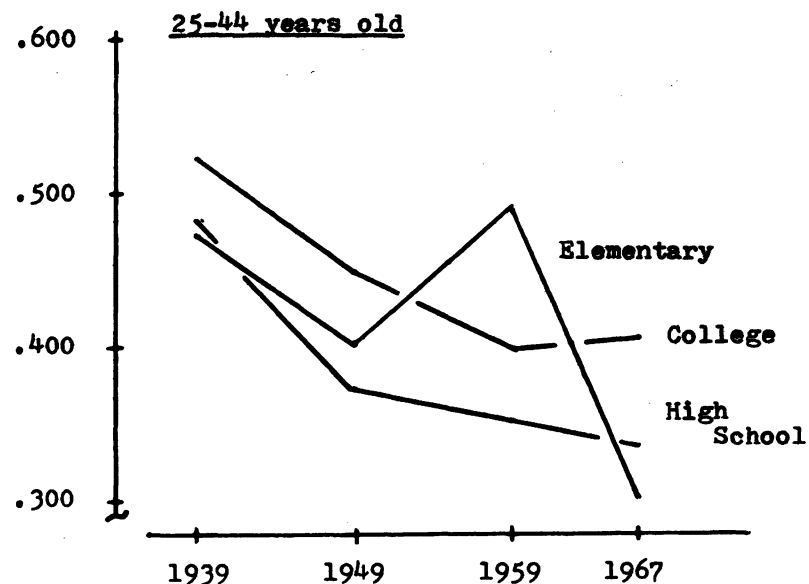
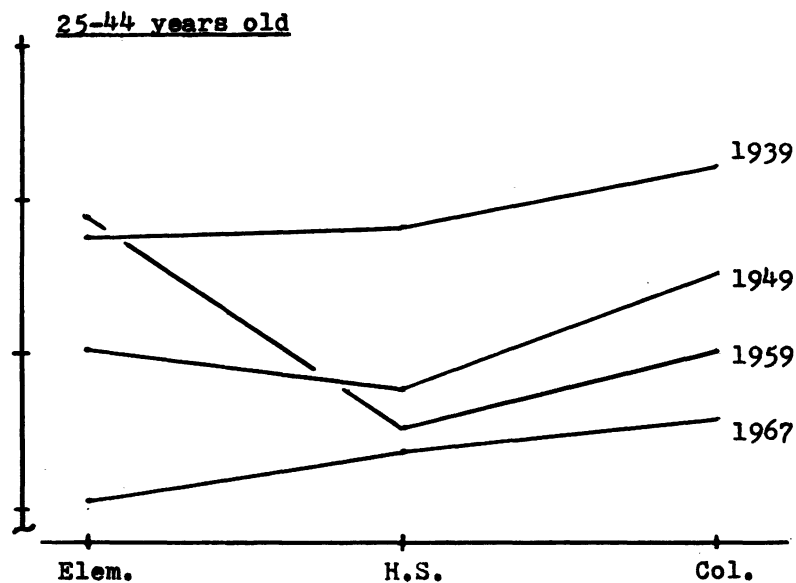


Figure 1. Plotted DM Values as Education Increases, By Age Group, For 1939, 1949, 1959 and 1967 (Source: TABLE 3)

Figure 2. Plotted DM Values Over Time- 1939, 1949, 1959 and 1967, By Age Group, For Each Level of Education (Source: TABLE 3)

education and age as white males may be systematically decreasing.

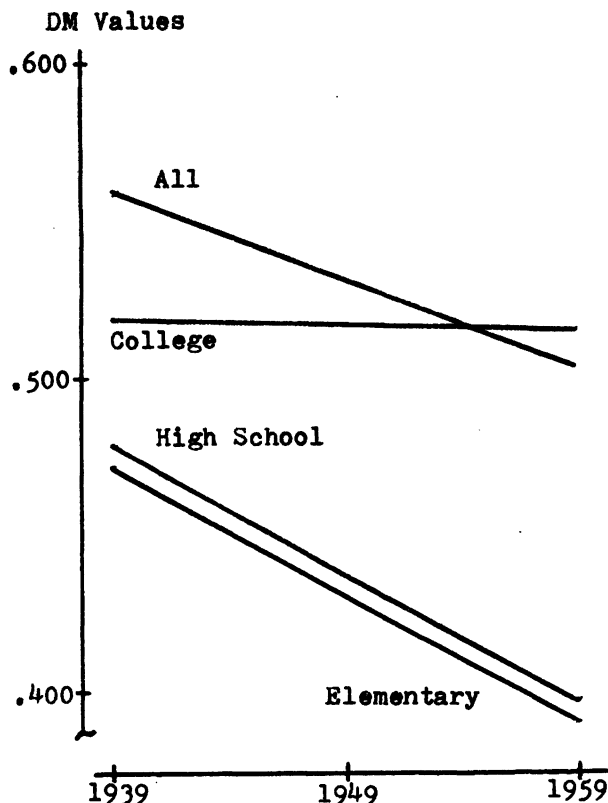


Figure 3. Plotted DM Values: 25-44 Years Old in 1939, and 45-64 Years Old in 1959, For Each Level of Education (Source: TABLE 3)

Footnotes

- (1) Becker, Gary S., The Economics of Discrimination, (The University of Chicago Press, Chicago, 1959), pp. 129-131.
- (2) Bosworth, Bruce, "A Quantitative Analysis of White-Nonwhite Income Differentials as Related to Education and Age," (Unpublished doctoral dissertation, New York University, Graduate School of Business Administration, 1971), p.4.
- (3) Table 1 sources: the 1939 and 1949 data appear as "Table 3. - Mean Income for Males 25 Years of Age and Over by Educational Attainment, Color, and Age, United States, 1939, 1949, and 1956," in Herman P. Miller, "Income and Education: Does Education Pay Off?," an article in Selma Mushkin (ed.), Economics of Higher Education, (U. S. Department HEW, Washington, D. C., 1962), p. 137. The original source indicated for this data is: 1939- the Sixteenth Decennial Census of Population, "Education: Educational Attainment by Economic Characteristics and Marital Status"; 1949- the U. S. Census of Population: 1950, Series P-E, No. 5B, "Education." The 1959 data source is "Table 1. Occupation and Earnings of

Males 25 to 64 Years Old in the Experienced Civilian Labor Force with Earnings in 1959, by Years of School Completed, Age, and Color, for the United States: 1960," pp. 2-3 in "Occupation by Earnings and Education," PC(2)-7B, U. S. Census of Population: 1960. For the 1967 data source see text.

(4) For a detailed discussion of the computer calculations performed see Bosworth Op. Cit., p. 46.

(5) Becker, Op. Cit., p. 14.

(6) Bosworth, Bruce, "White-Nonwhite Income Differentials as a Measure of Discrimination," 1970 Proceedings of the American Statistical Association, Social Statistics Section, p. 251.

(7) For Negroes within the age groups 25 to 44 years old and 45 to 64 years, the 1967 source data was incomplete due to the sample base being less than 75,000. Thus, no percent by years of school completed was given for higher income values. To overcome the downward bias that would result because of the lack of these distributions, I assumed that the distribution given for the Negro males 25 to 64 years old applied. An indication of this downward bias and its adjustment is illustrated by the following data actually calculated:

Mean Incomes of Negro Males with 1 to 3 Years of College

Age	Before Adj'm't	After Adj'm't
25-64	\$6488	\$6488
25-44	5950	6484
45-64	5690	6516

(8) These MDC values can be found in Table 45, page 190, of the work cited in footnote (2).