Center for Demography and Ecology

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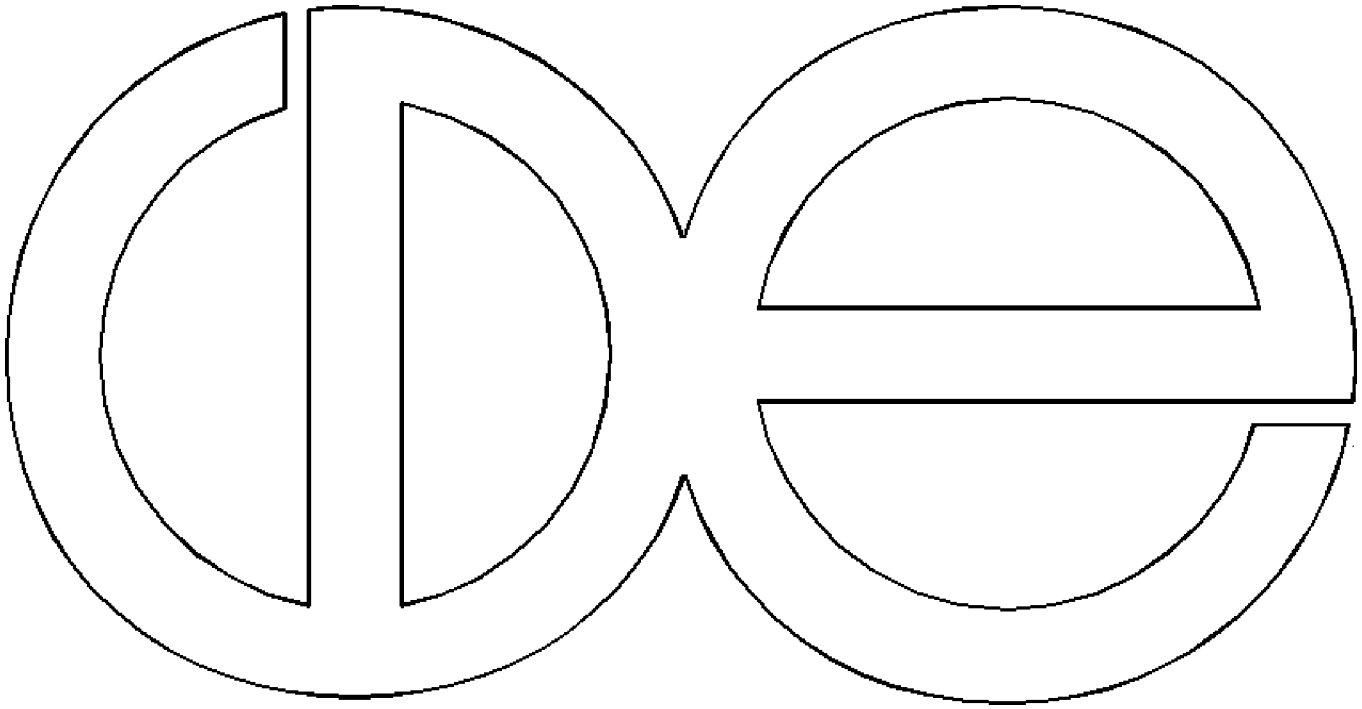

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INTRODUCTION

This paper examines the effects of race, sex, and family background on post-secondary school transition rates among recent black and white high school graduates. There has been much research on the linear effects of social origin, including race, sex, and family background on the final grade of educational attainment, but much less attention has been paid to racial differences in the crucial transition from high school to college. The transition to college is the cumulative result of a series of lower level transitions as well as of social selection processes operating in the school system. Thus, educational attainment, in this study, is regarded as a process of decisions and transitions, rather than a simple, single placement on a continuous scale of attainment (Mare, 1980; Raftery and Hout, 1990). While high school graduation rates are reaching saturation among blacks and whites alike, college transition rates still show large group differences between recent black and white high school graduates.

Of special interest are the trends in college enrollment rates among blacks and whites in the 1970s and early 1980s. Some highly publicized reports showed that black high school graduates became less likely to attend college in the fall immediately following their graduation from high school, while their white counterparts, in the same period, appear to have become more likely to attend college. From 1977 to 1987, the white enrollment rate steadily grew from around 50% to around 60%, while the rate for black high school graduates experienced a severe drop from almost the same rate as whites (50%) in 1977 to 36% in 1982 with a rebound up to about 48% in 1987, which is still below that in the early 1970s. This unfavorable trend was found to affect both black men and women and most family income groups in the black population except the highest income families (Hauser, 1987).

What accounts for the trend in racial inequality? Interested researchers tried to provide plausible explanations but definite causes are yet to be found.[1] Using three years of cross-sectional data from the Current Population Survey (CPS), I will try to examine the effects of race, sex and family background on probabilities of college entry for recent black and white high school graduates. Special attention will be given to changing patterns in the racial gap between blacks and whites over the last decade. While we have considerable observations on trends in educational inequality through the early 1970s, there have been no comparable efforts to monitor recent trends, especially in the late 1970s and 1980s, with the exception of some recent research (Grusky and Diprete, 1990; Hauser, 1986; 1987; 1990; Hout, Raftery and Bell, 1990; Kane, 1990).

What Have We Learned From Previous Studies ?

Using linear models of highest grade completed, past studies observed and predicted declining significance of race and family background over time (Blau and Duncan 1967; Featherman and Hauser, 1978 pp. 219-234). Featherman and Hauser (1978) found the ascriptive effects of social origins to be declining across two OCG surveys (1962 and 1973). In another study of trends in educational inequality, Hauser and Featherman (1976) found that while disadvantages associated with farm background, region, and race have decreased, those associated with parental education and father's occupational status have persisted over cohorts born during the first half of the twentieth century. Did these trends continue into the post-industrial period? Has the distribution of higher education among different racial and sexual groupings become more equal over time? Regarding the "declining significance of race," Wilson (1978), argued that racial differences in social mobility can now be explained for the most part by social class differences. Similarly, Jencks et al. (1972) argued that socioeconomic status and mental ability account for most of the variance in educational attainment between blacks and

whites, meaning conditional independence of race and educational attainment once other background variables are controlled.

While findings from past studies predict decline in the traditional depressing effect of belonging to a minority group, Sewell (1971) contended that as far as higher educational attainment is concerned "the socially disadvantaged" still seldom escape the depressing effect of their origin. The social selection, he suggested, may be most vividly apparent in the transition from high school to college.

The declining significance of social origin observed in past studies might have reflected demographic changes in the distribution of social background characteristics as well as actual changes in their effects on schooling (Duncan, 1967; Hauser and Featherman, 1976; Mare, 1979). Hauser and Featherman (1976), indeed, interpreted their finding with a cautionary note saying that "to a substantial degree, the mean shifts in educational attainment between cohorts over time may be attributed to parallel changes in their social background composition." For example, as minority family background gradually becomes upgraded and converged to that of the majority group (white/male) as a result of occupational structural change in society, the variance of family background among high school graduates will decrease over time and the depressing effect of social origin (e.g., race, sex, etc.) will appear to be reduced (Hout, Raftery, and Bell, 1990; Raftery and Hout, 1990).

The changing distribution of family background can also affect the extent to which schooling is allocated equally among social groupings indirectly by bringing in changes in school transition rates over time. For example, the size of the effect of social origin (e.g., being black vs. being white) on college enrollment would be deflated, as the average transition rate from high school to college increases and the majority group approaches a saturation point, that is, because of the compressed range of potential differentials. Thus if we want to adequately assess group

differences in educational attainment, we need to distinguish between the marginal distribution of formal schooling and the principles by which educational attainment is allocated over social groupings; the latter could remain unchanged while the former becomes more equal over time with the growing capacity of educational institutions in society (Hout, Raftery, and Bell, 1990).

Mare (1981) has shown that the regression coefficients of the linear probability model that has been extensively used to document decreasing significance of social origin actually confounds background effects with a demographic change in the distribution of education. In other words, the linear probability effects depend not only upon the true association between background and school transitions, but also on average progression rates. More importantly, if the average progression rate exceeds 0.5, which is also true for late 20th century U.S., the high progression rates deflate the background effect.[2] The result is that the effects of social origin variables (race, sex, SES) appear to have been attenuated over time. Thus, as Hauser (1986) noted, at least at the college level, enrollment rates by social status or racial groupings should be subject to more rigorous examination that takes into account (1) the marginal distribution of educational attainment and (2) compositional differences and changes of background variables between groups.

Using the logistic response model whose coefficients are not affected by changing marginal distributions of either independent or dependent variables, Mare (1981), indeed, observed that socioeconomic factors are becoming more important in determining who continues from one schooling level to the next. Mare's (1981) finding was replicated in Grusky and Diprete's (1990) study of recent trends in the process of stratification. Using the 14-year (1972-1987) cross-sectional data from the General Social Survey (GSS), they found that the downward trend lines for background effects (parental education and father's SEI) were weakened under logistic response models of educational attainment. Such findings imply that the "intrinsic

effects" of socioeconomic advantage may be relatively resistant to change.

I will examine changing patterns of racial and sexual differences in college entry, taking into account compositional changes in background variables. The changing contours of the "racial and sexual gap" will be assessed by including year x race and year x sex interaction terms in the basic model. Second, I will try to examine whether the effects of family background significantly differ between blacks and whites, thus affecting their chances for college differentially even if they come from the same social origin. If the effects of background do not differ between them and have been stable over time, then changing patterns of the racial gap could be explained by changing effects of race and sex by year net of other background effects and by compositional differences in background variables. Third, I will present predicted probabilities entering college for blacks and whites to see if blacks are more likely to enter college, once other socioeconomic disadvantages are controlled (Alexander, Pallas, and Holupka, 1984; Grusky and Diprete,1990).

For example, Alexander et al. (1984), using data from National Longitudinal Study (class of 1972) and the High School and Beyond (class of 1980), found that the predicted probabilities of college attendance were consistently higher for blacks than for whites regardless of sex, once one's socioeconomic status (SES) and educational resources were controlled. Thus, they attributed the observed group differences to their differences in SES, concluding that "when allowance is made for these differences, there is little indication that minority status itself is a barrier to college attendance" (p. 181). Their individual level analysis and conclusion based on it may be an oversimplification of the group-level trend that had been conspicuous during the period under study (in the late seventies and early eighties). They indeed included the race x period interaction effect term, which was estimated to be negative and significant, but didn't pay much attention to the significant trend. However, it deserves special attention when we study

black-white differences in college access during that period of time. Last, I will decompose group differences in college entry between blacks and whites to see whether the observed racial gap in college entry rates is due to changes and/or differences in background composition between blacks and whites: How much is due to compositional differences in background variables and how much is due to pure group membership?

ANALYTIC STRATEGY

For the analysis of transition rates that separates the effects of social origins and other influences (marginal distribution of education and average progression rate), the logistic-response model will be adopted. Under the logistic response model, estimated effects of independent variables are not affected by changing marginal distributions of either independent or dependent variables; this property does not hold for the case of linear probability models of schooling (Mare, 1981). The dependent variable is whether the individual has succeeded in entering college immediately following graduation (Y=1 if yes, or Y=0). Accordingly the probabilities predicted with the model are conditional upon high school graduation. The model can be expressed as follows:

$$Ln\ (P_{it} / 1\text{-}P_{it} \mid X) = B_{0t} + B_{jt} X_{ijt} \qquad (1)$$

where P_{it} is the probability that the ith individual will enter college at time t, and X_{ijt} is the value on the jth background variable for the ith individual at time t. In the model, B_{0t} is a constant and B_{jt} denotes the effect of a unit change in the jth background variable on the log odds of entering college. By properly specifying the model (i.e., by including some interaction terms of interest) we can analyze trends in the effects of race and sex. Because presentation of results is in most cases made in probability, the solution of equation (1) for P_{it}, if we set $B_{0t} + B_{jt} X_{ijt} = Z_{it}$, is:

$$P_{it} = exp(\ Z_{it}\ ) / (\ 1 + Exp(Z_{it})) \qquad (2)$$

Since the effect of X_{ijt} (e.g., B_{jt}) is not constant, assessing the impact of X_{ijt} on P(Y=1) requires some effort. One way to do this is to select interesting values of the independent variables (group mean X for a comparison between groups) and compute and compare the associated P(Y=1). Also replacing the group mean with the other group's mean value for background variables, we can get adjusted group P(Y=1) to separate compositional effects from pure group effects (e.g., race or sex effects). Equation (2) implies marginal change in P(Y=1) by a unit change in Xj—when it is continuous—which can be expressed as follows:[3]

$$dP(Y=1)/dX_{jt} = P(Y=1)[1-P(Y=1)]B_{jt} \quad (3)$$

The equation (1) will be estimated by the maximum likelihood method. The ML method gives asymptotically efficient and consistent estimates treating each unit as a separate observation. The ML estimation technique can be applied where continuous and categorical explanatory variables are mixed, as in our model (Hanusheck and Jackson, 1977: ch.7). This method also alleviates the assumption of grouped analysis that people with different characteristics but falling in the same cell have the same probabilities (Agresti, 1990; Aldrich and Nelson, 1988).

DATA AND VARIABLES

The analysis will be based on the October Educational Supplement to the CPS (Current Population Survey) for 1977, 1982, and 1987. In October of every year, a supplement to the CPS contains information on school enrollment for a reference person who is 3-34 years old in a national sample of approximately 58,000 households. The same survey also provides information for the person or persons in the same household who are the head of household and spouse of head of household on family income, education, metropolitan status, region, and other background information about the target person. Because of rules used in determining household composition, virtually all college students, unless they are married and living with their own

family, are counted as part of their parents' households, even if they study away from home. Because the data describe the school enrollment of the civilian, noninstitutional population of the U.S., people in the army or held in correctional institutions are not included. To maintain family linkage of the people in the sample, I selected those who are 14-34 years old, who graduated from high school in the current or previous year, and who are not the head of household or the spouse of head of household, which gave me a total of 8041 cases (7219 whites and 822 blacks).[4] The sample design of the CPS is a multistage stratified sampling of the U.S. population and not a simple random sample (Bureau of Census, Technical Paper 40 (1978)). The standard errors will be slightly underestimated, but it should not be serious (Hauser, 1987).

Measurement of Variables

I. Race (BLACK) is coded into 0 for whites and 1 for blacks; sex (FEMALE) is coded into 0 for males and 1 for females; age (AGE)[5] is his/her own age at the time of high school graduation; metropolitan status is categorized into (1) central cities of SMSA, (2) balance of SMSA, non-central city, and (3) non-SMSA area. The reference category is (1) central cities of SMSA.

II. Family Background: Father's education (FAEDUC) and mother's education (MAEDUC) are actual years of schooling completed by his/her father and mother; family income in log scale (LFINC) is measured as the natural logarithm of the raw family income in 1987 dollars using the Consumer Price Index. Initially the raw family income was constructed by converting each category to its midpoint; household head's occupational status (FSEI) is indexed by Duncan's SEI score ranging from 0 to 96. Family structure (FAMST) is measured by the type of the head of household and coded into 0 if s/he is from an intact family and 1 if broken (male or female single headed). With regard to parental education, the family structure variable implies that for broken family, mother's or mostly father's education is missing. For those cases I

replaced his/her racial group average score for each variable. Then, the effect of family structure (FAMST) reflects the relative advantage of students from intact families over those from broken families whose missing parent's education are of the average.

We should note the family background information does not refer to age 16 as in most previous studies, but is contemporary information at the time when the graduate could enter college. Thus, while the advantage is that the information is less vulnerable to measurement error, which plagued past studies based on retrospective measurement (Bielby, Hauser, and Featherman, 1977; Bowles, 1972), it has disadvantages too, which include lack of a common reference age for the background variable.[6]

One of the limitations of the CPS data is that they include no variables that have been believed to intervene between background and educational attainment, such as mental ability and significant other's influences. However, we believe that as the level of schooling goes up, especially for post-secondary schooling, the student population becomes homogeneous more in terms of mental ability than in terms of family background (Mare, 1980). Moreover, several important background variables combined in the model would reflect a significant portion of the variance attributable to mental ability. The list of background variables also omits the number of siblings variable, which has an important implication for the allocation and availability of family resources for the reference person in accessing college education. However, the CPS data do not, strictly speaking, contain number of siblings, but only the number of persons under age 18 in the household. Such persons may be non-siblings, and some siblings may not be in the household. Thus we assume that the effect of sibship size is not significantly different between blacks and whites when we compare their transition rates controlling for background factors.

III. Period: Considering the fluctuating trend in college enrollment rate, especially for blacks during the time period of 1977 to 1987, I coded years into dummy variables indicating

each specific year (Y82 and Y87). The reference year is 1977. Because we are using only three specific years, the trends that would emerge from the analysis, in a strict sense, cannot show a definite trend that exactly reflects what had happened during the last decade, but a broad picture of trend. Or it may be affected by the year-specific conditions of black and white school continuation, implying that results of our analysis are limited in generalizability.

RESULTS

Table 1 presents the means and standard deviations of selected background variables for black and white subsamples by year and for the pooled sample. We can see that the family background of blacks as well as whites improved in rough parallel over the last decade, when black-white differences in college entry increased. From the pooled sample table, we can read that blacks tend to be older than whites when they graduate from high school (see AGE), and they are more likely to live in broken families (see FAMST).

Though blacks' socioeconomic status has been upgraded gradually, the average status scores are still far below those of whites. For example, the average father and mother of blacks are still high school dropouts (< 12), while the average father and mother of whites are high school graduates (see FEDUC and MEDUC in the total sample). Also, family income and household head's SEI score show a considerable gap (1.7 times in raw family income and about 12 points in FSEI) between blacks and whites.

Table 2 presents observed trends in college entrance rates by race and sex from 1972 to 1987 to provide a backdrop for our analysis. The rates for both white males and females were increasing from around 56-57% in 1977 to about 60% for males and 63% for females in 1987, with only a slight downturn in 1982 for males. The rates for black males remained far below those of whites, around 46% during the late 1970s and early 1980s and then rebounded up to 56% in 1987. In contrast, the rate for black females, which was higher than black males, sharply decreased from 55% in 1977 to about 43% in 1982 and in 1987, which is lower than white females by more than 20% points and lower than black males by 13% points. Figure 1 shows the trends graphically.

By comparing the trends in background composition in Table 1 and the trends in college entry for blacks in Table 2, we can see an apparent incongruence between the two trends. As

shown in Table 1, all dimensions of socioeconomic status of blacks have been steadily upgraded in parallel to whites; however, the trend of college entry did not go with the trend in background composition but was actually deteriorating.

Our next step is to search for a college enrollment model that best describes the data and parameterizes the effects of explanatory variables. A series of comparison of fit between logit models is presented in Table 3. Because we are adopting a micro logit model using individual data, the likelihood ratio statistics (scaled deviance in GLIM) are not an absolute measure of the goodness-of-fit. However, the differences between nested models can be used as a measure of relative goodness-of-fit. These are distributed as chi-square[2] (Agresti 1990: ch. 4-5).

A few noteworthy patterns emerge from the goodness-of-fit tests. First, a comparison of fit between a logit model with only race and sex effect terms (Row 2) and a model that permits the effect of race and sex to vary across years (Row 4) yields the G*=21 with degrees of freedom = 4 ($p<.001$). Also, the three-way interaction term between race x sex x year (Row 5) improves the model fit significantly with $\chi^2 = 36$, d.f. = 2 ($P<.001$) above the two-way interaction model (Row 4). This implies that the effect of race varies not only across year but also the varying effect of race (e.g., being black) depends on sex. Substantively, if we estimate the model with the interaction terms, the result will be four different equations for the cross-section of race and sex (e.g., white male, white female, black male, black female).

Second, even after macro demographic and trend terms are entered, each of the family background effect terms improves the goodness-of-fit to a great extent (see Row 6-9). The age effect term (Row 10), which is intended to capture any effect of school retention left over background effects, is also important. If the age variable measures one's ability to successfully finish each level of schooling, then the age of the reference person at the time of high school graduation should reflect individual differences in the likelihood of entering college not explained

by family background factors. Last, one's family structure (intact vs. broken family) and residential location (central city of SMSA, balance of SMSA, non-SMSA) also explain variability in college entry significantly above and beyond all the other background effects (Row 11-12).

Third, the race by background interaction effect terms (Row 13) might improve the goodness-of-fit, as the likelihood ratio statistic (= 28, d.f.=10) shows, which is statistically significant at P<.005. But compared to the main effect terms, the joint interaction effects are minuscule and the estimated results show that their interaction effects with race are in most cases insignificant. Thus I assume that the background effects on the log odds of college entry are not significantly different between blacks and whites, and I do not include the race by background interaction effects in the final model.[7]

Table 4 presents estimated logit coefficients predicting the log odds of college entry for blacks and whites in the pooled sample. In Model I, only race and sex main and interaction effects and period main effects are specified. The effect of race (BLACK = -.307) is in the expected direction, negatively affecting blacks' college entry. Also the negative interaction effect of race and sex (BLACK.FEMALE) implies that the negative effect of being black is larger for females (-.508) than for males (-.307). Model II is further specified by including interaction effects between race, sex, and period as well as their main effects. Thus, it shows a group level macro trend in college enrollment rates. The two-way and three-way interaction effects between race, sex, and year suggest that not only did the effect of race (being black) change over time (BLACK.Y82, BLACK.Y87), but also the varying effects of race depend on sex. Especially the large negative three-way interaction effects between race, sex, and year (BLACK.FEMALE.Y82 = -.721; BLACK.FEMALE.Y87 = -1.01) suggest that the negative effect of being black increased for black females in 1982 and in 1987, which leads us to expect an even larger racial gap between blacks and whites among females than among males in the period. (These changing patterns of

racial gap will be illustrated in Figure 2.) Would these trends be observed even after background effects are controlled? Model III is our best model that predicts the log odds of college entry for blacks and whites upon high school graduation.

Results from Model III show that blacks' chances for college entry improve substantially when family background, age, and metropolitan status are controlled. The negative effect of being black turns into a positive effect, implying that blacks have a net advantage over whites in entering college if they come from the same family background as their white counterparts. Considering the fact that in our model an explicit measure of mental ability is not included—even though we assume the age term might mitigate the problem to some extent—the positive effect of being black is impressive.[8] However, the negative race x year interaction effects, which represent changing effect of race, imply that the relative gain for being black, conditional upon family background, has decreased over time (BLACK.Y82 = -.034; BLACK.Y87 = -.055). Note the change of sign of the race x year interaction effect from Model II to Model III.

Second, even after family background is controlled, large negative interaction effects of race by sex by year persist. Again, negative period effects lowered black females' chances for college over time even compared to black males, as the coefficients show (BLACK.FEMALE.Y82 = -.792; BLACK.FEMALE.Y87 = -.931). The persistence of the negative period effects for blacks even after background effects are controlled implies that they could not be a consequence of changes in family background.

Family Background Effects

As we expected, the negative age effect (b =-.143, s.e =.029) estimated in Model II (Table 4) indicates that the older the student is at graduation from high school, the less likely he/she is to enter college. Thus, we can say that school retention has a significantly negative effect.[9]

Substantively, the estimated coefficient predicts that one year of retention in school progression reduces one's odd of college entry by a factor of exp(.143) = 1.15. Also, Table 4 shows that the effects of family structure and metropolitan location are significant determining factors above and beyond the socioeconomic status of one's family. For example, living in an intact family rather than in broken family increases the odd of college entry by a factor of exp(.354) = 1.42, and living in a non-metropolitan area (NON-SMSA) or in non-central city SMSA area rather than in central cities of SMSA decreases the odd of entering college by a factor of exp(-.256) =.77 and of exp(-.266) =.77 respectively. All the indicators of the socioeconomic status of a family (father's and mother's education, family income, household head's SEI) have significant effects on their sons' and daughters' chances for college entry. Given the fact that those variables are highly correlated, the estimates show large effects of family background on who goes to college for both blacks and whites.

Trends in Black-White Differences in College Entry

Figure 2 shows adjusted and unadjusted trends in the relative chances for college entry between blacks and whites. Alexander et al. (1987) Black-white differences in relative terms are based on the logit equations presented above and thus measured on the logit scale, which has a natural point of equality (=0) between comparison groups. Because the trends are different between males and females, separate trend lines are plotted. The adjusted trend line takes into account the effects of background variables (father's education, mother's education, father's SEI, family income, family structure, location of residence, and age) and their changes over time. Because the effect coefficients are the same for both blacks and whites, "adjusted," here, means being adjusted for the mean differences in background composition between the two populations.

The two trend lines (adjusted and unadjusted) are nearly parallel. Especially for females,

exactly the same trend is observed before and after adjustment. While the adjustment also takes into account compositional changes in family background over time among blacks and whites, the parallel trend lines prove that the negative trends cannot be a consequence of changes in family background of blacks and whites (see also, Hauser, 1987).

Black males, according to the predicted result, have a consistently higher probability of entering college if they had the same background as their white counterparts even during the last decade when the observed macro-trend showed that black-white differences were increasing. For black females, however, the net advantage of being black was observed only in 1977. After 1982, their chances for college were lower than for white females, even after background variables were controlled. Also, the unadjusted trend line shows that for females the racial gap had been rapidly widening through the 1980s. This leads us to suspect that a large part of the widening racial gap during the last decade was due to black women's lowered chances for college entry.

Table 5 presents predicted probabilities of entering college upon high school graduation for blacks and whites by sex and by year. The predicted probabilities are computed for the black and the white high school graduates who are average on their values of family background variables. The selected best model (Model III) appears to represent the observed macro-trend (Table 2) very well, which can be seen by comparing the observed and the predicted group probabilities. The average white's probability of entering college increased consistently from about .57 in 1977 to about .63 (.67 for females) in 1987 except for males in 1982. On the other hand, probabilities for black males remained far lower than whites, around .45 in 1977 and in 1982 until it increased up to .55 in 1987. For black females, a somewhat different trend is observed. Their probabilities for college entry consistently decreased from .56 in 1977 to about .43 in 1982 and in 1987. Recall that these are predicted probabilities of entering college for the average blacks and whites in specific survey years. Thus, they cannot be interpreted as reflecting

true trends during the last decade. Rather, the predicted probabilities and trends could be a reflection of specific conditions in selected survey years.

Decomposition of Group Differences

So far, we have tried to document black-white differences in the probabilities of college entry. The estimated logit equations (1-4) for blacks and whites derived from our best model reveal that differences in the log odds of college entry result from two sources: (1) group differences in the background composition and (2) differences in the intercepts. Formally, the two components of group differences can be expressed as follows:

$$Logit\ (W) - Logit\ (B) = [B_o wt - B_o b_t] + B_j [X^j_{wt} - X_{jbt}] \quad (4)$$

where Logit(W) and Logit(B) denote the predicted log odds of college entry for the average whites and blacks respectively. The first term represents differences in the intercepts between blacks and whites at time t, which is a function of changing effects of race and sex by year. The second term, where B_j denotes the logit coefficient for the jth background variable, which are estimated to be in- variant across race, sex, and over time, and where X_{jwt} and X_{jbt} denote whites' and blacks' respective population mean values on the jth background variable at time t, represents the compositional part of the predicted differences in the log odds of college entry between blacks and whites.

Table 6 presents the components of group differences by sex and by year. The results show how much of the predicted difference is due to compositional differences in background and how much is due to differences in the intercepts. The intercept differences should be interpreted as an "unexplained" part of the differences in the log odds of college entry due to group membership (e.g., being black/white and being female/male) at a specific time point (t), because the intercept represents a hypothetical probability for those whose values are all zero on

background variables (Jones and Kelley, 1984). It would also imply that the model is not specified enough and that relevant attainment-related attributes of high school graduates associated with race and sex are omitted from the model.

The results show that there is a large positive effect of being black that offsets what would otherwise be larger group differences due to compositional differences between blacks and whites. For example, the difference in the log odds of college entry between white males and black males in 1977 would have been .805 instead of .545 if there were no offsetting effect of being black (=-.260), which continued through 1987. The same argument can be applied to the trend for black females in 1977 as the large offsetting effect of the intercept (-.620). But for females the positive offsetting effect of being black is observed only in 1977 and thus in 1982 and in 1987 group differences are in large part explained by compositional differences between whites and blacks (75% in 1982; 60% in 1987). However, that does not mean that the increasing group differences can be explained by changes in family background over time. For females as well as for males, the component of differences due to compositional differences has been stable or slightly decreased over time in its absolute value, as we can see if we read the figures across the rows of Table 6. Rather, the large group differences for females were due to negative period effects for them that turned the net advantage of being black (-.620) in 1977 into an additional disadvantage of being black over background differentials in 1982 (=.207) and in 1987 (=.366), these added to existing differences due to background composition.

SUMMARY AND CONCLUSION

This paper documents the changing effects of race and sex on probabilities of entering college upon high school graduation, taking into account the effects of family background during the last decade, 1977-1987. We have observed that (1) blacks in the aggregate are less likely to

enter college than whites; but (2) once family background, age, and the location of residence are controlled, black males tend to be more likely to enter college than whites; (3) the observation (2) can be applied to black females only in 1977, and since the early 1980s, black females' odds of entering college fell below those of white females even when their backgrounds were the same. This observation for females is explained by the negative period effects for blacks, which were more prominent for females than for males, especially since the early 1980s.

The decomposition of group differences showed that changing black-white differentials in the log odds of college entry were largely a result of changing effects of group membership (race and sex) over time (see the changes in the intercept portion of group differences over time in Table 6). More specifically, the "unexplained" net advantage of being black over white was observed to be decreasing for both males and females but more severely for females. Thus, while the significance of family background remained stable during the period, the decreasing net advantage of being black in entering college resulted in the increasing "racial gap" during the last decade as was shown in Figure 2. Seen in this way, group differences in college entry between blacks and whites cannot be explained away by their background differences (c.f. Alexander, Pallas, and Holupka, 1987). Even after background effects are controlled, there remains a significant portion of group differences between the two groups to be explained (e.g., the differences in the intercepts).

What accounts for the negative period effect and the resultant racial gap in accessing college education? As stated above, our model does not explain but only document the changing effects of race and sex net of other background effects. Blacks' likelihood of college entry may well depend on variables that have not been considered by current models (Kerckhoff and Campbell, 1977; Gottfredson, 1981). Or, blacks' tendency to continue schooling beyond high school may be more vulnerable to changing economic conditions and/or public policies than

those of whites (Kane, 1990; see also Paul, 1990; Orfield, 1990; Jackson, 1990 for more studies on effects of public policy on college entry). For example, Kane (1990) contended that increasing college costs combined with the depressed rate of federal grant for college-goers during the early 1980s is largely responsible for the observed deterioration of the racial gap in college entry, especially among low-income blacks. Hauser (1987), however, criticized explanations based on changes in family incomes among black population; the trend line of the log odds of college entry, even when adjusted for family income and other determinant variables, went parallel to the unadjusted trend line, showing no significant change in the pattern of black-white differences over time.

Because the trends and results that emerged in our analysis of the CPS data might be conditional upon specific conditions of selected survey years, a more rigorous study of trends in educational inequality between blacks and whites should include more years of data to avoid problems associated with the widely spaced measurements in this study.

Notes

1. Several explanations offered include: (1) changes in the economic status of blacks, (2) changes in the propensity of boys and girls to attend college, (3) changes in the financial aid policy, and (4) changes in propensities to enter military service or labor market (Hauser, 1987).

2. The relationship between the coefficient of the linear probability model and that of the logistic-response model, which is invariant to changes in marginals, can be expressed as:

$$B_{jt} = L_{jt}\, P_{it}\, (1-P_{it}) \qquad (1)$$

where B_{jt} denotes the linear probability effect and L_{jt} denotes the logistic response effect of background. If we take the derivative of the equation (1) with respect to P_{it}, then,

$$\frac{B_{jt}}{P_{it}} = L_{jt}\,(1-2P_{it}) \qquad (2)$$

By the deflation factor in the equation (2), $(1-2P_{it})$, as P_{it} exceeds 0.5 point, the right hand side turns into negative and the linear effect of background declines over time.

3. Because of the attenuation factor P(1-P) in the equation, the effect of a unit change in X_j is clearly related to B_j but is not completely determined by it. The magnitude of the effect varies with the values of the independent variables.

4. The cases which were excluded because the respondent is the head of household or the spouse of the head of household are as below:

	1977		1982		1987	
	Male	Female	Male	Female	Male	Female
Whites	177	290	131	215	121	219
	(1626)	(1816)	(1507)	(1719)	(1236)	(1378)
Blacks	14	39	9	26	8	22
	(164)	(259)	(163)	(218)	(136)	(179)

5. AGE ranges from 14-34. Most past research focused on 18-19 year olds, so some old high school graduates are excluded *a priori*. However, if the average age of high school graduation differs systematically between blacks and whites or the black population is more likely to be delayed in finally graduating and in entering college, then it will bias the estimation by depressing the blacks' rate. On the other hand, including some old high school graduates might deflate the blacks' group rate, as they are less likely to enter college, and delayed graduation is more prevalent among the black population.

6. Not only are the measurements contemporaneous but in most cases they are reported by the mother of the reference person. That is, “spouse of head” or “female head” are the most likely CPS respondents.

7. The estimated parameters showed that while the background effects are consistently smaller for blacks — especially the effect of father’s education — compared to whites, most of them are not significantly different between whites and blacks.

8. The positive effect of group membership on college entry for blacks cannot be explained by the model, though the result is in line with previous findings that documented the relative advantage of being black after controlling for various background variables (see, Alexander, et al. 1987).

9. Here it is likely that while black high school graduates tend to be older than whites, the inclusion of them might depress their group’s rate of college entry because the older high school graduates are persons who had a harder time academically.

REFERENCES

Agresti, A. 1990. *Categorical Data Analysis*. New York: John Wiley and Sons.

Alba, R. 1987. "Interpreting the Parameters of Loglinear Models" *Sociological Methods and Research* 16: 45-77.

Aldrich, J. H. and F. D. Nelson. 1988. *Linear Probability, Logit, and Probit Models*. Beverly Hills: Sage.

Alexander, K.L., A. M. Pallas, and S. Holupka. 1987. "Consistency and Change in Educational Stratification: Recent Trends Regarding Social Background and College Access." *Research in Social Stratification and Mobility* 6: 161-185.

Bielby, W. T., R. M. Hauser, and D. L. Featherman. 1977. "Response Errors of Nonblack Males in Models of the Stratification Process." Ch. 14 in *Latent Variables in Socioeconomic Models,* edited by A. S. Goldberger and D. Aigner. Amsterdam: North Holland.

Blau, P. M. and O. D. Duncan. 1967. *The American Occupational Structure*. New York: John Wiley and Sons.

Bowles, S. 1972. "Schooling and Inequality from Generation to Generation." *Journal of Political Economy* 80: S219-S251.

Duncan, B. 1967. "Education and Social Background." *American Journal of Sociology* 72: 363-372.

Featherman, D. L. and R. M. Hauser. 1978. *Opportunity and Change*. New York: Academic Press.

Gottfredson, D. C. 1981. "Black-White Differences in the Educational attainment Process: What Have We Learned?" *American Sociological Review* 46: 542-557.

Grusky, D. B. and T. A. Diprete. 1990. "Recent Trends in the Process of Stratification." Unpublished Paper.

Hanushek, E. A. and J. E. Jackson. 1977. *Statistical Methods for Social Scientists*. New York: Academic Press.

Hauser, R. M. 1986. "Notes on the Distribution of Schooling in the Black Population, 1940-1980." CDE Working Paper 86-8, Center for Demography and Ecology, University of Wisconsin-Madison.

———. 1987. "College Entry Among Black High School Graduates: Family Income does not Explain the Decline." CDE Working Paper 87-19, Center for Demography and Ecology, University of Wisconsin-Madison.

———. 1990. “The Decline in College Entry among African Americans: Findings in Search of Explanation.” CDE Working Paper 90-20, Center for Demography and Ecology, University of Wisconsin-Madison.

Hauser, R. M. and D. L. Featherman. 1976. “Equality of Schooling: Trends and Prospects.” *Sociology of Education* 49: 99-120.

Hout, M., A. E. Raftery, and E. O. Bell. 1990. “Making The Grade: Educational Stratification In the United States, 1925-1989.” Paper presented at the International Sociological Association World Congress in Madrid, July, 1990.

Jackson, G. A. 1990. “Financial Aid, College Entry, and Affirmative Action.” *American Journal of Education* (August, 1990): 523-550.

Jaynes, G. D. and R. M. Williams, Jr. (ed.). 1989. *A Common Destiny: Blacks and American Society*. Washington DC: National Academy Press.

Jencks, C., M. Smith, H. Acland, M.J. Bane, D. Cohen, H. Gintis, B. Heyns, and S. Michelson. 1972. *Inequality: A Reassessment of the Effect of Family on Schooling in America*. New York: Basic Books.

Jones, F. L and J. Kelley. 1984. “Decomposing Differences between Groups: A Cautionary Note on Measuring Discrimination.” *Sociological Methods and Research* 12: 323-343.

Kane, T. J. 1990. “College Entry by Blacks Since 1970: The Role of Tuition, Financial Aid, Local Economic Conditions and Family Income.” Unpublished Paper.

Kerckhoff, A. C. and R. T. Campbell. 1977. “Black-White Differences in Educational Attainment Process.” *Sociology of Education* 50: 15-27.

Mare, R. D. 1979. “Social Background Composition and Educational Growth.” *Demography* 16(1): 55-71.

———. 1980. “Social Background and Educational Continuation Decisions.” *Journal of the American Statistical Association* 75: 295-305.

———. 1981. “Change and Stability in Educational Stratification.” *American Sociological Review* 46: 72-87.

Mortensen, T. G. and Z. Wu. 1990. “High School Graduation and College Participation of Young Adults by Family Income Backgrounds 1970 to 1989.” ACT Student Financial Aid Research Report Series, Vol. 90-3.

Orfield, G. 1990. “Public Policy and College Opportunity.” *American Journal of Education* 28: 317-337.

Paul, F. G. 1990. “Access to College in a Public Policy Environment Supporting Both

Opportunity and Selectivity." *American Journal of Education* 28: 351-388.

Portes, A. and K. L. Wilson. 1976. "Black-White Differences in Educational Attainment." *American Sociological Review* 41: 414-431.

Raftery, A. E. and M. Hout. 1990. "Maximally Maintained Inequality: Expansion, Reform, and Opportunity in Irish Education, 1921-1975." Paper presented at the ISA Meetings, Madrid, July, 1990.

Sewell, William H. 1971 "Inequality of Opportunity for Higher Education." *American Sociological Review* 36: 793-809.

Smith, H. L. and P. L. Cheung, 1986. "Trends in the Effects of Family Background on Educational Attainment in the Philippines." *American Journal of Sociology* 91: 1387-1408.

Wilson, William J. 1978. *The declining significance of race*. Chicago: University of Chicago Press.

Winsborough, H. H. and P. Dickinson. 1971. "Components of Negro-White Income Differences." Proceedings of the American Statistical Association, Social Statistics Section: 6-8.

Table 1. Means and Standard Deviations of Selected Background Variables by Year by Race

	1977		1982		1987		Total	
	Whites	Blacks	Whites	Blacks	Whites	Blacks	Whites	Blacks
AGE	18.02	18.22	18.09	18.09	18.12	18.27	18.06	18.19
	(0.77)	(1.11)	(0.80)	(0.92)	(0.96)	(1.10)	(0.88)	(1.01)
FEDUC	12.47	10.67	12.68	11.38	13.08	12.13	12.72	11.34
	(2.96)	(3.08)	(2.86)	(2.58)	(2.78)	(2.11)	(2.88)	(2.72)
MEDUC	12.23	11.19	12.36	11.36	12.70	12.03	12.72	11.49
	(2.27)	(2.70)	(2.34)	(2.98)	(2.39)	(2.34)	(2.34)	(2.73)
FSEI	39.17	27.03	40.20	28.30	41.89	31.33	40.31	28.71
	(20.55)	(15.96)	(20.79)	(16.46)	(20.44)	(17.13)	(20.63)	(16.55)
LFINC	10.27	9.61	10.17	9.61	10.21	9.71	10.22	9.64
	(0.70)	(0.76)	(0.73)	(0.75)	(0.80)	(0.89)	(0.74)	(0.80)
FAMST	1.83	1.57	1.81	1.55	1.77	1.52	1.81	1.55
	(0.38)	(0.50)	(0.39)	(0.50)	(0.42)	(0.50)	(0.40)	(0.50)
N	2628	300	2537	273	2074	239	7219	822

Note: AGE : age at the time of high school graduation;
FEDUC : father's education in years of schooling;
MEDUC : mother's education in years of schooling;
FSEI : the Duncan SEI score for household head's occupation;
FLINC : natural log of family income;
FAMST : intact family (=1) vs. broken family (=0).

Table 2. Observed Proportion of College Entry among Recent High School Graduates by Race by Sex by Year

Whites						Blacks					
Male			Female			Male			Female		
1977	1982	1987	1977	1982	1987	1977	1982	1987	1977	1982	1987
0.561	0.542	0.604	0.571	0.604	0.636	0.458	0.462	0.563	0.551	0.430	0.429
(1324)	(1252)	(1035)	(1304)	(1285)	(1039)	(128)	(124)	(103)	(172)	(149)	(136)

See Figure 1 for trends

Table 3. Comparison of Goodness-of-Fit among Selected Logit Models.

MODEL	L^2	d.f.	χ^2	d.f.
1. Constant	10969	8040		
2. (1) + RACE*SEX	10930	8037	-78	-3
3. (2) + YEAR (MODEL I)	10916	8035	-28	-2
4. (3) + RACE.YEAR +SEX.YEAR	10909	8031	-28	-2
5. RACE*SEX*YEAR (MODEL II)	10891	8029	-36	-2
6. (5) + FSEI	10027	8028	-1728	-1
7. (6) + FEDUC	9722	8027	-608	-1
8. (7) + MEDUC	9599	8026	-248	-1
9. (8) + LFINC	9543	8025	-112	-1
10. (9) + AGE	9517	8024	-52	-1
11. (10) + BRKFAM	9492	8023	-50	-1
12. (11) + METRO (MOEL III)	9475	8021	-54	-1
13. (12) + RACE*(Family Background Var.)	9447	8011	-56	-10

NOTE: FSEI = Duncan SEI score for household head's occupation;
FEDUC = father's education in years of schooling;
MEDUC = mother's education in years of schooling;
LFINC = natural log of raw family income;
FAMST = broken family vs. Intact family;
METRO = metropolitan status.
*: Family Background Var. includes FSEI, FEDUC, MEDUC, LFINC, and FAMST.

Table 4. Estimated Logit Coefficients Predicting College Entry among Recent High School Graduates

	MODEL I	MODEL II	MODEL II
Constant	.214 (.044)	.245 (.055)	-3.117 (.673)
BLACK	-.307 (.114)	-.415 (.193)	.260 (.122)
FEMALE	.145 (.048)	.042 (.078)	.084 (.086)
BLACK.FEMALE	-.201 (.152)	.332 (.253)	.360 (.276)
AGE			-.143 (.029)
FSEI			.016 (.001)
FAEDUC			.147 (.012)
MAEDUC			.136 (.013)
LFINC			.173 (.040)
FAMST			.354 (.065)
SMSA (Central City) : referenced			
SMSA (Non-Central City)			-.266 (.072)
NON-SMSA			-.256 (.073)
Y77: referenced			
BLACK.Y82	.095 (.272)		-.034 (.297)
BLACK.Y87	.248 (.283)		-.055 (.310)
FEMALE.Y82	.214 (.112)		.264 (.126)
FEMALE.Y87	.096 (.119)		.112 (.131)
BLACK.FEMALE.Y82	-.721 (.362)		-.792 (.364)
BLACK.FEMALE.Y87	-1.01 (.381)		-.931 (.413)
L^2	10916	10902	9475
d.f.	8035	8029	8021

Table 5. Predicted Probabilities [P(y=1)] of College Entry for Average Black and White High School Graduates by Sex by Year (Observed Group Rate)*

	1977	1982	1987
White Male	.560 (.561)	.551 (.542)	.628 (.604)
White Female	.589 (.571)	.634 (.605)	.673 (.636)
Black Male	.453 (.457)	.455 (.462)	.555 (.563)
Black Female	.564 (.551)	.434 (.430)	.432 (.430)

* Note: These probabilities are for the average black and white high school graduates who are living in intact families in non-central city SMSA. The probabilities should be lower for those from broken families and higher for those living in central cities.

Table 6. Components of Group Differences in the Logit of College Entry between Whites and Blacks: [(Logit (w)-Logit(B)] by Sex, and by Year*

Male	1977	1982	1987
Differences Due to:			
Intercept	-.260 (-47.7)	-.226 (-58.5)	-.205 (-67.6)
AGE	.022 (4.0)	.000 (0.0)	.022 (7.3)
FSEI	.213 (39.1)	.190 (49.2)	.169 (55.8)
FAEDUC	.301 (55.2)	.191 (49.5)	.141 (46.5)
MAEDUC	.165 (30.3)	.135 (35.0)	.091 (30.0)
LFINC	.104 (19.1)	.097 (25.1)	.085 (28.1)
Total	.545 (100.0)	.386 (100.0)	.303 (100.0)*

Female	1977	1982	1987
Differences Due to:			
Intercept	-.620 (-335.1)	.207 (25.3)	.366 (41.9)
AGE	.022 (11.9)	.000 (0.0)	.022 (2.5)
FASEI	.213 (115.1)	.190 (23.2)	.169 (19.3)
FAEDUC	.301 (162.7)	.191 (23.3)	.141 (16.1)
MAEDUC	.165 (89.2)	.135 (16.5)	.091 (10.4)
LFINC	.104 (56.2)	.097 (11.8)	.085 (9.7)
Total	.185 (100.0)	.819 (100.0)	.874 (100.0)*

* Note: % points are rounded up to integer points, so differences are due to rounding errors.

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